

THE ATHENÆUM

Journal of English and Foreign Literature, Science, and the Fine Arts.

No. 1768.

LONDON, SATURDAY, SEPTEMBER 14, 1861.

PRICE
FOURPENCE
Stamped Edition, 5d.

MINERALOGY.—KING'S COLLEGE,
London.—Professor TENNANT, F.R.S., will commence a COURSE OF LECTURES ON MINERALOGY, with a view to facilitate the study of GEOLOGY, and of the Application of Mineral Substances in the ARTS. The Lectures will begin on Friday Morning, October 4th, at a Quarter-past Nine o'clock. They will be continued on each succeeding Wednesday and Friday, at the same hour. Fee, 3s. R. W. JEFF, D.D., Principal.

UNIVERSITY COLLEGE, LONDON.—
JUNIOR SCHOOL, under the Government of the Council of the College.

Head-Master—THOMAS HEWITT KEY, A.M.
The SCHOOL will RE-OPEN on TUESDAY, September 24, for New Pupils. All the Boys must appear in their places, without fail, on Wednesday, the 25th, at a Quarter-past Nine o'clock. The Session is divided into Three Terms—viz., from the 24th of September to Christmas, from Christmas to Easter, and from Easter to the 1st of August. The yearly payment for each Pupil is 18s., of which 6s. is paid in advance in each Term. The hours of attendance are from a Quarter-past Nine to Three-quarters-past Three o'clock. The Afternoons of Wednesdays and Saturdays are devoted exclusively to Drawing.

The subjects taught are, Reading, Writing, the English, Latin, Greek, French and German Languages, Ancient and Modern History, Geography, Physical and Political, Arithmetic and Book-keeping, the Elements of Mathematics, Chemistry, and Natural Philosophy, Social Science, Gymnastics, Fencing, and Drawing. Any Pupil may omit Greek or Greek and Latin, and devote his whole attention to the other branches of Education.

There is a general Examination of the Pupils at the end of each session, and the Prizes are then given. At the end of each of the first two Terms there are short examinations, which are taken into account in the general examination. No absence by a boy from any one of the examinations of his Classes is permitted except for reasons submitted by the Head-Master.

The discipline of the School is maintained without corporal punishment. A Monthly Report of the conduct of each Pupil is sent to his parent or guardian.

Further particulars may be obtained at the Office of the College.

CHAS. C. ATKINSON, Secretary to the Council.

The College Lectures in the Classes of the Faculty of Medicine will commence on Tuesday, the 15th of October.

August, 1861.

GOVERNMENT SCHOOL OF MINES,
JERMYN-STREET, LONDON.

Director—SIR RODERICK I. MURCHISON, D.C.L. &c.

The Prospects for the Session, commencing on the 7th October next, will be sent on application to the Registrar. The Courses of Instruction embrace Chemistry, by Dr. Hofmann; Physics, by Prof. Tyndall; Natural History, by Prof. Huxley; Geology, by Prof. Ramsay; Mineralogy and Mining, by Mr. Verrington Smith; Metallurgy, by Dr. Percy; and Applied Mechanics, by Prof. Willis.

TRENHAM KECKS, Registrar.

PHARMACEUTICAL SOCIETY OF GREAT
BRITAIN, 17, Bloomsbury-square, W.C.

SCHOOL OF PHARMACY.—SESSION 1861-62.

The Session will commence on Tuesday, October 1, and extend to the end of July, 1862.

Lectures on Chemistry and Pharmacy, by Dr. Redwood; on Botany and Materia Medica, by Professor Bence Jones.

Laboratory Course, for Practical Instruction in General and Pharmaceutical Chemistry, under the direction of Prof. Redwood.

Students have free admission to the Library and Museum.

Two Scholarships (the Jacob Bell Memorial Scholarship of 30s. a year each, with free Laboratory instruction during the period of scholarship, are annually awarded.

For detailed Prospectuses and further information apply to the Secretary.

A PHYSICIAN, residing at the West-End of
London, wishes to meet with a Young Gentleman about to Study Medicine or Science in any of the London Schools, to whom he could offer an advantageous home and a share in the personal instruction of his own son.—Apply to Dr. LAKESIDE, 8, Saville-row, W.

ST. MARY'S HOSPITAL MEDICAL
SCHOOL.—THE WINTER SESSION will commence on TUESDAY, October 1st, at Eight o'clock, P.M., with an Introductory Address by Mr. Spencer Smith.

The Medical Appointments in this Hospital are annually conferred upon Pupils without additional fee. The advantages of Five of these Appointments far exceed as many SCHOLARSHIPS of Fifty Pounds each.

Physicians—Dr. Alderson, Dr. Chambers, Dr. Sibson, Dr. Handfield Jones, Dr. Sieveking and Dr. Markham.

Burgeons—Mr. Coulson, Mr. Lane, Mr. Ure, Mr. Spencer Smith, Mr. Walton and Mr. James Lane.

Physician-Apothecary—Dr. Tyler Smith.

Ophthalmic Surgeon—Mr. White Cooper.

Anal Surgeon—Mr. Toynbee. Surgeon-Dentist—Mr. Sercombe.

LECTURERS.

Clinical Medicine—Dr. Alderson, Dr. Chambers, Dr. Sibson.

Clinical Surgery—Mr. Coulson, Mr. Lane, Mr. Ure.

Physiology—Dr. Chambers and Dr. Sibson.

Law—Mr. Lane and Dr. Broadbent.

Midwifery—Mr. James Lane and Mr. Gascoyen.

Operations on the dead body—Mr. Walton.

Dissections—Mr. Gascoyen and Mr. Norton.

Chemistry and Practical Chemistry—Mr. Hewitt.

Midwifery—Dr. Tyler Smith and Dr. Graily Hewitt.

Materia Medica—Dr. Tyler Smith and Dr. Dresser.

Medical Jurisprudence—Dr. Sanderson.

Dissections—Mr. Gascoyen and Mr. Norton.

Ophthalmic Surgery—Mr. White Cooper.

Anal Surgery—Mr. Toynbee.

Comparative Anatomy—Mr. Broadbent.

Natural Philosophy—Mr. Sanderson.

PRIZES, &c.—The Medical appointments in the Hospital. A Scholarship in Anatomy of the annual value of 25s. A Prize of 10s. for Students of the first year. Prizes in the several Classes at the end of each Session.

The Fee for the Hospital Practice and Lectures required by the Royal Colleges of Physicians and Surgeons, and the Society of Apothecaries, is 50s. 6s., payable by instalments.

A detailed Prospectus will be sent, and further information obtained, on application to

St. Mary's Hospital, August, 1861.

QUEEN'S COLLEGE, CORK.

President—SIR R. KANE, M.D. F.R.S.

Vice-President—JOHN RYALL, LL.D.

FACULTY OF MEDICINE, Session 1861-62.

Dean of Faculty—DENIS B. BULLEN, M.D.

Professors.

Anatomy and Physiology, Practical Anatomy—J. H. CORBETT, M.D. L.R.C.S.I.

Practice of Medicine—D. C. O'Connor, A.B. M.D.

Practice of Surgery—Denise B. Bullen, M.D.

Materia Medica—Parrell O'Leary, Esq. LL.D. A.M. M.D. F.R.S.

Midwifery—J. R. Harney, A.B. M.D.

Natural Philosophy—John England, A.M.

Chemistry, Practical Chemistry—J. Blyth, M.D.

Zoology, Botany—Joseph Remy Greene, A.B.

Modern Languages—R. De Vercoeur, D.-ss-L.

Logic—Geo. Sidney Read, A.M.

CLINICAL MEDICINE AND CLINICAL SURGERY, at the North and South Infirmary, by the Physicians and Surgeons of these Institutions. CLINICAL MIDWIFERY at the Lying-in Hospital.

The MEDICAL SESSION will be OPENED on MONDAY, the 24th of October, 1861, and the Lectures will commence on the 4th of November. The Department will be opened for Dissections on the 15th of October, under the direction of the Professor of Anatomy and Physiology, assisted by Dr. Shinkwin, Demonstrator.

Eight Scholarships will be awarded to Students in Medicine, thus—Six Junior Scholarships, of 50s. each, to be held for three years; two Senior Scholarships, of 40s. each, to Students commencing their fourth year.

By order of the President,

ROBERT JOHN KENNY, Registrar.

UNIVERSITY OF EDINBURGH.

Chancellor—LORD BROUGHAM.

Vice-Chancellor—Principal SIR DAVID BREWSTER, K.H.

Rector—The Right Hon. W. E. GLADSTONE.

The Session will be publicly OPENED on MONDAY, November 4th, 1861, at Two o'clock, P.M., when an ADDRESS to the Students will be delivered by the PRINCIPAL.

The CLASSES for the different Branches of STUDY will be opened as follows—

I. LITERATURE AND PHILOSOPHY.

Classes. Days and Hours of Attendance. Professors.

Junior Humanity Nov. 5, at 12 & 3 P.M. Prof. Pillans.

Senior Humanity Nov. 5, at 9 & 11 A.M. Prof. Blackie.

First Greek Nov. 5, at 11 A.M. Prof. Blackie.

Second Greek Nov. 5, at 11 A.M. Prof. Blackie.

Third Greek Nov. 5, at 11 A.M. Prof. Blackie.

First Mathematical Nov. 5, at 10 A.M. Prof. Kelland.

Second Mathematical Nov. 5, at 10 A.M. Prof. Kelland.

Third Mathematical Nov. 11, at 10 A.M. Prof. Fraser.

Logic and Metaphysics Nov. 5, at 11 A.M. Prof. Macdougall.

Moral Philosophy Nov. 5, at 11 A.M. Prof. Tait.

Natural Philosophy Nov. 5, at 11 A.M. Prof. Tait.

Rhetoric and Belles-Lettres Nov. 5, at 11 A.M. Prof. Tait.

English Language and Literature Nov. 5, at 4 P.M. Prof. Aytoun.

Practical Astronomy Dec. 5, at 12 P.M. Prof. Smyth.

Agriculture Nov. 7, at 4 P.M. Prof. J. Wilson.

Universal History Nov. 6, at 3 P.M. Prof. James.

Theory of Music Nov. 4, at 10 & 12 P.M. Prof. Donaldson.

II. THEOLOGY.

Hebrew—Junior Class Nov. 6, at 2 P.M. Rev. D. Liston.

Advanced Class Nov. 6, at 10 A.M. Rev. D. Liston.

Hebrew and Arabic Nov. 6, at 10 A.M. Rev. D. Liston.

Divinity Nov. 6, at 10 A.M. Rev. T. J. Crawford, D.D.

Senior Class Nov. 6, at 11 A.M. Rev. Wm. Steenson, D.D.

Divinity and Church History Nov. 6, at 1 P.M. Rev. Robert Lee, D.D.

Biblical Criticism and Biblical Antiquities Nov. 6, at 12 P.M. Rev. Robert Lee, D.D.

III. LAW.

Medical Jurisprudence (for Students of Law) Dec. 2, at 3 P.M. Dr. Traill.

Civil Law Nov. 5, at 4 P.M. Prof. Swinton.

Law of Scotland Nov. 5, at 3 P.M. Prof. Swinton.

Conveyancing Nov. 5, at 4 P.M. Prof. M. Bell.

IV. MEDICINE.

Dietetics, Materia Medica, and Pharmacy Nov. 5, at 9 P.M. Dr. Christison.

Chemistry Nov. 5, at 10 P.M. Dr. J. Playfair.

Surgery Nov. 5, at 10 P.M. Dr. Miller.

Institutes of Medicine Nov. 5, at 11 P.M. Dr. Bennett.

Midwifery and Diseases of Women and Children Nov. 5, at 11 P.M. Dr. Simpson.

Clinical Surgery Nov. 5, at 12 P.M. Prof. Syme.

Monday and Thursday Nov. 5, 12 to 3 P.M. Dr. Bennett and Laycock.

Clinical Medicine—Tuesday and Friday Nov. 5, 12 to 3 P.M. Prof. Goodair.

Anatomy Nov. 5, at 4 P.M. Dr. Henderson.

Natural History Nov. 5, at 3 P.M. Prof. Allman.

Practice of Physic Nov. 5, at 3 P.M. Dr. Laycock.

Anatomical Demonstration Nov. 5, at 4 P.M. Prof. Goodair.

ROYAL INFIRMARY, at Noon, Daily.

Practical Anatomy, under the Superintendence of Professor Goodair.

Practical Chemistry, under the Superintendence of Dr. Lyon Playfair.

Analytical Chemistry, under the Superintendence of Dr. Lyon Playfair.

N.B.—Information relative to the Curricula of Study for Degrees, Examinations, &c., may be obtained on application to the Secretary at the College.

A Table of Fees may be seen in the Matriculation Office, and in the Reading-Room of the Library.

By authority of the Senate,

ALEX. SMITH, Sec. to the University.

September, 1861.

CRYSTAL PALACE SCHOOL OF ART, SCIENCE, AND LITERATURE.—THE NEW TERM will COMMENCE on NOVEMBER 1st NEXT, and will CLOSE on JULY 31st, 1862. During the Vacation extra Lessons are given by some of the Professors.

By order of the Committee,

F. K. J. SHENTON, Supt. Lit. Department.

QUEEN'S COLLEGE, LONDON, 67 and 68, Harley-street, W.—Incorporated by Royal Charter, 1833, for the General Education of Ladies, and for granting Certificates of Knowledge.

Principal—THE LORD BISHOP OF WESTMINSTER.

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Rev. T. A. Cook, M.A.

E. Fusco, B.A.

Rev. F. H. Plumtree, M.A.

Rev. F. Garden, M.A.

W. Hughes, F.R.G.S.

John Hullah.

Alph. Mariette, M.A.

Rev. F. D. Maurice, M.A.

Rev. M. Meyrick, A.K. C.V.

Rev. E. H. Plumtree, M.A.

W. Cave Thomas.

Henry Warren.

Godlieb Weib, Ph.D.

Lady-Resident—Miss PARRY.

The Classes for Michaelmas Term will open on Thursday, October 3. Individual instruction is given in Vocal Music by Mr. George Benson, and in Instrumental by Messrs. Barnett, Dorrell, and G. May; and by Misses Green, Green, and Heaton.

Conversation Classes in French, German, and Italian are formed on the entry of six names. Arrangements are made for the reception of Boarders.

Prospectuses, with full particulars as to Fees, Scholarships, Examinations, &c., may be had on application to Mrs. Williams, at the College Office.

E. H. PLUMPTRE, M.A., Dean.

QUEEN'S COLLEGE SCHOOL, 67 and 68, Harley-street, W.
Lady-Superintendent—Miss HAY.
Assistant—Miss ROSALIND HOSKING.

The Classes for the Michaelmas Term will meet on Thursday, Sept. 26. Pupils are admissible at six years old and upwards.

Prospectuses, with full particulars, may be had on application to Mrs. Williams, at the College Office.

E. H. PLUMPTRE, M.A., Dean.

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Mr. and Mrs. R. H. CLARK.

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References.—Rev. J. C. Harrison, 24, Queen's-road, Regent's Park; J. G. Wilkinson, M.D., 4, St. John's Villas, Finchley-road; James Walton, Esq., 25, Upper Lower-street, W.C.

REIGATE GRAMMAR SCHOOL.—The Trustees of the Reigate Grammar School are prepared to receive APPLICATIONS from Gentlemen desirous of obtaining the SITUATION of MASTER of the Reigate Grammar School.

No candidate will be qualified to be elected Master unless he be a member of the Church of England, and also either a Graduate of one of the English, Scotch or Irish Universities, or certificated according to the highest class of diploma conferred under the authority of the Committee of Council of Education. The salary in the first instance will be 150s. a year, with house and garden rent free. The salary will be gradually increased by the prospective improved rental of the school property. The Master will be at liberty to take a limited number of Boarders. The management of the School will be conducted in accordance with the scheme recently sanctioned by the Charity Commissioners. Copies of this scheme may be obtained by sending 12 postage-stamps to Mr. V. L. THORNTON, Reigate, who will give any further information required. Applications, accompanied by testimonials, must be sent to Mr. THORNTON, or on or before the 15th of October next.

W. M. THORNTON, Clerk to the Trustees.

Reigate, Sept. 2, 1861.

LADIES' COLLEGE, THE WOODLANDS,
UNION-ROAD, CLAPHAM RISE.—The Pupils will RE-ASSEMBLE on MONDAY, September 16, when Classes will be formed for French, German, Italian, History, Mathematics, English Literature, Latin, Drawing, Singing, Music, &c. The Lectures on Natural History and Chemistry will be resumed in October, and Lectures on other subjects will be delivered during the Term.—The Woodlands, Sept. 16.

THERE are a few VACANCIES in a SCHOOL

at RYDE, ISLE OF WIGHT. The Head-Master is a Graduate in Double Honours of Cambridge, and married. Attention is devoted to Subjects for Special Examinations as well as to Classics and Mathematics.—Address REV. A. Z. Booth, 367, Regent-street, W.

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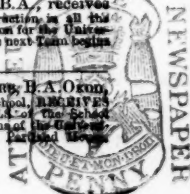
TITORS for Sandhurst, Woolwich, or the Staff College, and Candidates for Direct Commissions or Staff Appointments, are PREPARED in all the Branches (compulsory and optional) of PAID PROGRAMME, at the Practical Military College, Sunbury, S.W.—Apply for Prospectuses, &c. to Captain LEEDS.

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FREE CHURCH, 14, NEWMAN-STREET, Oxford.

FREE CHURCH, 14, NEWMAN-STREET, Oxford. street. To-morrow, SUNDAY, Sept. 13, Service at 11. Dr. PERFIT—“Nature of Evil, and its Relation to Human Life.” Free. Evening, at 7—“Did Jesus supernaturally predict his sufferings and Death?”—Intuitions.—Tickets to be had in lobby.

SCHOLASTIC. — WANTED, in a large BOARDING SCHOOL, at the ensuing quarter, an EXPERIENCED TEACHER, who would be considered the chief of six Assistant Masters. Candidates must possess proficiency in Classics and Mathematics, and a thorough knowledge of School details.—Address, stating age, qualifications, and references, to A. B. Lewis's Medical Library, 15, Gower-street North, W.C.

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GERMAN, French, Italian.—**Dr. ALTSCHUL,** Author of 'First German Reading-Book,' (dedicated to Her Grace the Duchess of Sutherland,) &c. M. Philolog. Soc., Prof. Education.—**TWO LANGUAGES TAUGHT** in the same Lesson, or alternately, on the same Terms as One, at the pupils' or at his house. Each language spoken in his **PRIVATE LESSONS**, and select **CLASSES** for Ladies and Gentlemen. Preparation for all ordinary pursuits of life, the Universities, Army and Civil Service Examinations.—8, OLD BOND-STREET, PICCADILLY.

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Director of Education—Mr. JOHNSON.

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LONDON, SATURDAY, SEPTEMBER 14, 1861.

LITERATURE

Virginie de Leyva; ou, Intérieur d'un Couvent de Femmes en Italie, au Commencement du Dix-septième Siècle, d'après les Documents Originaux, par Philartète Chasles, Professeur au Collège de France, Conservateur à la Bibliothèque Mazarine. (Paris, Poulet-Malassus et De Broise.)

Mademoiselle de Lève, as the French have called her, La Signora di Monza, as the Italians style her, is a high personage in the world of drama and legend. Except Beatrice Cenci, no woman of private rank has entered so much into the poetry and fable of modern Italy. She figures in an episode of Manzoni's great romance 'The Betrothed,' and is the heroine of Rosini's 'Lady of Monza.' But the true history of this ardent and voluptuous woman is more singular and dramatic than the wildest efforts of the Italian poets. Massinger should have told her story. A modern writer is bound by the conventional laws of probability even in his fictions; and what fabulist could dream of presenting to his reader a young girl, pensive and charming, vowed to a religious life, who would admit a lover to her cell, who would corrupt her nuns into becoming the accomplices in her crimes, and who would remove by violence every one who came across her guilty path? The line of probability must be drawn. It may be at the Château d'If, or in the Isle of Monte Christo. It must be somewhere; and wherever it is drawn, it would be outside the walls of the Convent of St. Catherine of Monza. A heroine who stood by, and saw murders committed for the gratification of her lust and her revenge, would be rejected by every sense. Dumas himself would not adventure on such a figure. Such, however, was the real Lady of Monza, whose story M. Philartète Chasles, following the documents collected by the zeal and industry of Signor Dandolo, has told in 'Virginie de Leyva,' with deep philosophical insight and with singular literary power.

Signor Dandolo, who has brought together, as the workman brings brick and mortar to the architect, the materials on which M. Chasles narrates and speculates, is not only an Italian author of many good volumes, an antiquarian and archaeological scholar, a searcher amongst the archives of Milan, of Monza and Pavia, but a descendant of the great Venetian Doges of his name. Possessed of a small estate in the Apennines, he retired from political agitations into solitude in 1850, to meditate under the shade of the fir and chestnut trees on the history of his country in past times. Here, the descendant of the Doges, following his labour of love (as well capable of doing his work in his own day and generation as were the Doges, his ancestors, to govern their Republic and conduct its foreign wars), restored and annotated the authentic documents of which M. Philartète Chasles has made use.

Don Antonio de Leyva, born in the province of Navarre, of an obscure but gentle race, was a soldier by profession, a bandit by nature. Pride and poverty had made him a Free Lance, and at the bidding of Charles the Fifth he went into Italy, with hordes of his proud and impoverished countrymen, to cut Italian throats and surprise Italian seigniories. Indeed, he was one of that race of brigands which profited by the intestine quarrels of Italy to establish in both north and south that Austro-Spanish influence which has just been swept away by the guns of Solferino and Marsala. Don Antonio was the man for his work. Danger

was to him a delight, and exercised over him the fascination of a personal vice. It is a trite enough saying, that a man who cares nothing for his own life is the master of every man who does care; but this respectable old truth is the secret of Don Antonio's success in the Milanese. Contempt of death made him a great man. Brave, instant, unscrupulous, his passions were restrained by neither love nor fear. At once sensual and ambitious, he cared little for persons and nothing for principles in the exercise of his great bodily and mental powers—for nothing indeed beyond the riotous joy of carrying his point against a friend, a mistress, or an enemy. No desperate wretch in the army of Bastard William or in the forlorn hope of Pizarro set his life more completely on the throw of the dice than Don Antonio. But he won the game. In his own poor country, had there been no wars to draw him off, he would have been a contrabandista or a matador. In the conquered province of the Milanese he became a powerful partisan warrior and the Lord of Monza, that Richmond of Milan, in which until lately was preserved the Lombardic crown. Charles took care that his faithful servant should be well encouraged. So Antonio de Leyva, the poor Navarrese, was raised into the highest rank of Italian nobles, and when he went to his rest a sumptuous monument in the Church of San Dionigi of Milan recorded the virtues and exploits of the heroic and exemplary Antonio de Leyva, Prince of Ascoli!

The family took root in their new home. Don Martino, son of Antonio, sent his daughter Virginia, a girl of such rare and noble beauty that her portrait (painted in after life by Daniel Crespi) might be mistaken for an artist's dream of St. Catherine, to be educated at the Convent of Monza. In her own right, she was Lady of the district. The frugal family desired to retain this rather splendid part of their property, and Don Martino left his son the Principality of Ascoli, and placed his daughter Virginia, as the fashion in the highest families was, in the convent in which she had herself been trained. This convent, which was at Monza, and within her own magisterial jurisdiction, belonged to the order of St. Catherine. Its inmates gave their time to teaching, and among the pupils who came to them for instruction was a young lady of Monza, Isabella degli Ortesii. A handsome youth, Osio degli Osii, whose house looked down into the convent-yard, saw Isabella and made love to her by signs. The girl accepted his admiration. Sister Virginia, who caught Isabella making signs to Osio, not only reprimanded her for such levity, but sent for Signor Molteno, notary of Monza, and instructed him to inform the family of what she had seen. Isabella's father took her from the convent and married her to a man of her own age and rank. Osio, vexed with Molteno, struck a poniard to his heart, went home to his house, armed his servants, barricaded his doors, and stood on his defence. Carlo Pirivano was the magistrate of Monza, but Pirivano had a most unwholesome dread of Molteno's fate. Osio was a gentleman, and the offences of gentlemen were not to be searched too strictly. Justice was blind. Virginia felt a feminine compassion for a young lover who had lost through her act a mistress, and had revenged himself upon the more immediate instrument of his loss. As feudal Lady of Monza, exercising seigniorial rights, Virginia's will on such a point was law to Pirivano. Osio went to thank her, and the young assassin fell in love with his beautiful benefactress. Virginia was twenty years of age; by nature ardent, and by habit self-indulgent. She returned his passion.

The difficulty in the way of their meeting—not to speak of its enormous immorality—had been very great; and only that the Convent of St. Catherine was cursed with a most depraved confessor in Arrighone—a man who seems to walk visibly out of one of Boccaccio's garden-gates,—the pollution that ensued upon their meeting would have been impossible. Osio had gained Arrighone to his interests; and the monk, who had been repulsed in some dishonourable proposals of his own to the beautiful and noble nun, had shown the impassioned boy how he might approach the woman of his heart. Under the pretence of thanking her for staying the process against him, he had counselled him to make known his love boldly. "I saw this young man," said Virginia, in one of her many depositions, "for the first time from the window of my Sister Candida's cell, at which I happened to be standing. This window looked upon the garden. He made a polite bow, and signed that he had a note to deliver to me. I was very much incensed against Molteno's murderer, and resolved to follow him without pity. He had a very humble, suppliant, yet well-bred air; his bearing was so noble and distinguished that I could not refuse to receive the note." When she had first seen the gay and youthful figure, she had said to Candida, "Oh, can anything be more beautiful?" Candida confessed these words to Arrighone, and Arrighone repeated them over their wine to Osio.

Virginia struggled in the toils spread around her by the gay seducer who was following his pleasure, and the false confessor who was following his cupidity and revenge. The force of her own passions made their work but too easy. "It was a power," she said in her depositions, "altogether devilish. For all the treasures of Spain, and for all the thrones of its princes, I would not have loved Osio. I would have made a pilgrimage. I beat myself with rods until the blood ran down my body. But the passion increased in vigour. I saw him in everything. I no longer slept; I no longer lived. One day, he begged that I would consent to kiss a gold box set with diamonds, which he at once took back and pressed to his lips; it was an amulet which Arrighone had prepared for him, and which, being blessed with holy water, would overcome all my scruples. Osio gave me a book from the library of my Father Confessor, the same Arrighone, in which it was written that a layman might enter without sin into the cell of a nun, and that the only sin consisted in the nun quitting her retreat. I was in despair, and wished that I were dead."

The poor lady struggled with the coil; but the insolent audacity of Arrighone put an end to her scruples; for even in the cell of her convent, and in a province of which she was the feudal head, Virginia found that she needed a protector against his arts. He unmasked, or pretended to unmask, his face. He sent her a short and insolent note, declaring that he was the true writer of all the letters signed by Osio; that he loved her, and would insist on some return. Virginia treated him with lofty and tragic scorn, and threw herself at once into her young lover's arms.

The amour lasted long. A servant girl, Catherine de Meda, took the responsibility before the world of the children born of this intrigue. Now and then the better mind of Virginia returned upon her; when she shut herself in her room, threw the secret keys into a well, and had the passage from Osio's house built up. But she soon repented of her virtue; and the amour which began with a murder soon grew

into a strange familiarity with blood and crime. Meda was the first to fall. This girl, after going all lengths to screen her mistress, threatened to expose her. Virginia, with the help of two of the nuns, tried to kill her, but failed. Osio dashed her brains out. The two nuns assisted him to bury the body of the poor girl. An apothecary, named Ranieri, spoke of the disorders in the convent, and the Princes of Ascoli, Virginia's kinsmen, hearing of the intimacy formed between Osio and Virginia, and fearing lest political troubles might fall upon them in consequence, had him arrested, and confined in the state prison of Pavia, on the charge of violating a religious house. Virginia stirred herself to save her lover. A solemn protestation of the nuns, declaring that the rumour of disorders at St. Catherine was a vile scandal, and that there had never been the slightest intimacy between Osio and Virginia, being drawn up, Osio was set at liberty, and in a few hours after his return to Monza, Ranieri was shot. Virginia hid her lover for fourteen days in her cell; but the cry for pursuit and vengeance reached the Cardinal Borromeo, who paid a visit to the Convent of St. Catherine, had a long interview with Virginia, and, startled by the frank audacity of her confessions of sin in the matter of love, ordered the Lady of Monza herself to be arrested and sent to Milan.

This interview would make a picture. The Cardinal was an old man of princely and saintly race. Virginia was thirty-two years old; her beauty brightened by passion and preserved by the cloister. The Cardinal received her gently; spoke of many trifles with the graceful ease acquired by long habit of dealing with high-born sinners; glided into more serious topics, religious and moral; and chatted with her playfully about her duties to herself, her race, her profession, and her country. She saw his drift, and met him boldly. "You placed me," she exclaimed, "against my will, in a religious house; you made me take the vow before I was of age. I was bound to the altar by force. Therefore, my profession of a religious life is null. I must marry. I have made my choice. Unite me to the man that I have chosen." The Cardinal, struck dumb by this plain and prompt avowal, left the room without a word. A carriage with four mules came to the gates at night; Virginia was put into it; and it carried her to the convent of the Bochetto, at Milan.

The two nuns who had tried to kill Meda, trembling for their lives, sent to Osio; and the very next night after Virginia's departure, they escaped from St. Catherine's under his protection. Two of his servants, Ottavia Ricci and Benedetta Homati, were near at hand, to aid him or avenge him. They arrived at the banks of the Lambro, a little mountain torrent, with which the tourist of Lake Como is familiar. Ricci hurled one of the nuns into the flood. Osio disengaged himself of the murderer by a few strokes under his mantle, and the remaining three persons—the nun, the seducer and the servant—pursued their journey into a wood, where Osio threw the second nun into a well, and then stabbed Homati, the witness of these new crimes. But the two nuns were not killed. By a miracle, the woman was recovered from the well, and the one thrown into the Lambro escaped with her life, to become the chief witnesses against Osio and Virginia.

Osio had to fly into the forests which still cover the mountains at the foot of Lake Como. There he lived as an outlaw, with a band of followers desperate as himself. The Conde de Fuentes, the Spanish governor of Milan, ordered his house at Monza to be razed, a ruined wall alone being left to mark the site. Foiled in

every attempt to arrest him by stratagem or force, Fuentes proclaimed a reward for any one who would bring him in, alive or dead. A companion of his youth betrayed and murdered him, in a manner the most singular. This companion asked him to his house as a change from his desolate life in the woods. Osio went. In the midst of their excesses Osio told his friend how he had killed Catherine de Meda. His host had an instrument made exactly like that with which Meda had been knocked down, and when all was ready for the act he invited Osio to go down into the wine-cellar with him to drink a particular wine. A friar was below to receive his confessions; the servants of the house seized him, and the master struck him in the nape of the neck precisely as he had struck the girl in the Convent of St. Catherine. Next day his handsome head was fixed on the ruined wall at Monza.

The parties were tried and condemned to various penalties. Arrighone, the vilest sinner of the whole, received three years in the galleys. Virginia was immured in a convent. Once or twice we get glimpses of her in the letters of Cardinal Borromeo. She passed her life, he says, in prayers and tears; and she died at last in the very odour of sanctity—as Borromeo says, *Come una santa!*

Signor Dandolo and M. Chasles appear to consider that the conventual system made Virginia what she afterwards became—the rival of Beatrice Cenci in shame and suffering, as she was in the fatal gifts of beauty, will, and individuality. We think, in snapping at general conclusions on the influences of religious seclusion, they underrate the force of personal character. Doubtless, M. Chasles is philosophically right in saying, that in the monastic system "the best education of a man—that which teaches him to judge and then leaves him free to choose for himself, is absolutely prohibited." In the monastery the first of all virtues is obedience, and the habit of obedience, our philosophers urge, is relaxing and destructive to the individual mind. This may be also true. Clear, very clear, it is that the education of a monk or of a nun is not the best training for a man or woman entering on the rough duties of active life; but then it ought to be remembered, for the other side, that a monk is not meant for the life of a skipper, nor a nun for that of a *vivandière*. A woman who takes the veil, whatever may have been the cause, looks forward to a career of order, calmness, and devotion; one in which there should be no temptation to resist, no difficulties to be met. Dash, energy, and will may be required in the world, even from girls and women, and when softened and mellowed by gentler qualities, these robust and masculine virtues may become very attractive in the eyes of men, but the very theory of a religious life, which excludes all contest, rivalry and passion, also excludes, and that logically and necessarily, the teaching which would make girls useful in a booth or successful at a bazaar—rivals to Mrs. Jarley or Rebecca Sharp. Surely, it is but fair to judge each system by its effect in producing what it is intended to produce. It is no impeachment of the value of geometry that it will not teach you to swim. It is no fault of a musical education that it will not make you a dead shot. Geometry makes geometers, music musicians, monasteries monks. When M. Chasles complains that the monastic system takes away the right of judging and choosing for oneself, he makes, we submit, an unphilosophical complaint. He might as well object to the earth being round or sugar being sweet. It would be as proper to attack the Institute of France, because it has never produced a great general, as

to impeach the Convent of St. Catherine, because its system of training is not one that would strengthen a Mdle. de Mars to walk through her slippery world without a fall. The habit of submission may have a virtue of its own humble kind, though such a virtue would be useless to Robinson Crusoe on his island, or to General Bonaparte in his first Italian campaign. A more robust and active quality is required for success. But a nun does not wish to succeed. She aspires to no more than to endure or to serve. Sworn from her youth to a career divided between charity and prayer, she puts away, with the fascinations of womanhood, all need for the strength or cunning which resists the tempter's arts. That in evil days temptation may intrude into the convent, as it intrudes into the home, there are too many facts in history to prove. We know the stories of the Medici. We have heard the scandals against the Regent. We have read Boccaccio and the imitators of Boccaccio in our own time. But we are not aware that any body of facts has ever been produced to show that, in such evil days, the licence has been greater in the convent than in the cottage,—each measured, as is fair, by the opportunities and immunities for vice which it presents. When the whole body of society is dissolved in sensuality, it is impossible for even the best to escape some sort of contamination; yet no man in his senses will maintain that, even in the very worst periods of social disorder, the inmates of religious houses were not better, measured by their temptations, than the women of the surrounding hamlets.

Our analysts, in their pride of science, forget, we think, how much, in such a case as that of Virginia de Leyva, is due to individual character. In the world, as in the cloister, she would have fallen into lawless love. Had she not been Virginia, she would probably have been Lucretia. The Borgias were De Leyvas on a grander scale and in a more splendid scene. Virginia was the true complement of Don Antonio; with the same vigorous, daring, self-indulgent nature, carrying into the recesses of the convent the principles of a camp. The scene which M. Chasles quotes from the interview between the sinful lady and the Cardinal destroys the theory that her vicious life had been in any way the result of the conventual system of education, as established in Italy and exemplified at Monza.

M. Victor Euphémion Philarète Chasles (who dedicates this volume to the Author of 'Pendennis' and 'Vanity Fair') is understood to be a candidate for the honours of the Academy; the "English candidate" he is called by his opponents: and the story of his literary life is such as to interest English readers in no common degree in his success. The son of a revolutionary general, who had been a Professor of Rhetoric before he took up the profession of war, and of a Huguenot mother, he was apprenticed in Paris to a printer. This printer, a disciple of Rousseau, was arrested by the Government of the Restoration as a man of dangerous opinions; and little Philarète, as his apprentice, passed two months with him in jail. Chateaubriand took pity on the child, and procured his liberation. Philarète then came to London, where he remained for about seven years, completing his education, and acquiring our language and literature. From London he travelled into Germany. On his return to Paris, a Saxon in culture, a Gaul in spirit and style, he became secretary and assistant to M. de Jouy. Soon he won attention to himself; in 1827 he divided with M. Saint-Marc Girardin the

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prize of Eloquence proposed by the Academy for an Essay on the Sixteenth Century; and was immediately attached to the staff of the *Journal des Débats*, on which excellent paper he has continued down to the present day, very much to the profit of its readers, and, among other things very greatly to the advantage of English and German writers. He also began to write for the *Revue des Deux Mondes*. Successively he became, as his power expanded and his fame enlarged, Doctor of Letters, Director of the Mazarine Library, Chevalier of the Legion of Honour and Professor of Foreign Languages and Literature in the College of France. His literary works are of peculiar interest to an Englishman. More even than M. Guizot, M. Chasles represents English literature in France;—and the election into the Academy of the “English candidate,” when it eventually occurs, may be taken as a compliment by the whole English nation. Among his printed works we have a volume of ‘Studies of the English Civil Wars,’ two volumes ‘On the England of the Eighteenth Century,’ a volume ‘On English Manners and Literature in the Nineteenth Century,’ and a volume ‘On Shakspeare.’ These works are not merely popular summaries, like some other works which we could name, thrown off by a learned Frenchman for the use of Frenchmen less learned; but are profound studies of the several subjects, based on real reading, and illumined by a rare and masculine intelligence.

M. Chasles’ position in the republic of letters is sufficiently original, and yet he is thoroughly representative of a class. By birth a Gaul, by training an Englishman, he brings together and harmonizes two literary methods and two systems of thought. The deep admiration for Shakspeare which is visible in all his writings, leads him to deny the force and reject the authority of many of those artificial conventions of arrangement and style which have so long ruled despotically over the French mind, to the exclusion, as Englishmen think, of nature, freshness and individuality from some of the most brilliant and perfect productions of French genius. Of course, he has not done this without penalties. The French are the slaves of rules. Voltaire found Shakspeare an inspired savage. M. Chasles, who has in his genius somewhat of the philosophic humour of Elia, is treated by the small fry of literary badauds as a savage without the inspiration. Strange to say, this extension of culture beyond the ordinary domain of the French writer has been M. Chasles’ chief impediment with the Academy. The Forty never forget that they are French, and some of the meaner spirits among them jealously deny the merits of every literature save their own. But exclusion on such a ground from a seat otherwise won is evidently untenable in reason, and we should think will not be much longer maintained in practice.

The Theory of the Foreign Exchanges. (Effingham Wilson.)

SINCE the famous attack of Adam Smith upon the delusions and absurdities of the mercantile system, even practical men have picked up enough of Political Economy to feel a little ashamed of the old doctrines of money and exchange. But prejudices of so long a growth are not uprooted in a day. The phraseology in which the tenets of Mun and Davenant were embodied still flourishes within a circle of considerable radius round the Royal Exchange. There, we learn, from City Articles and Money Market Intelligence, men still talk of unfavourable balances,—of disastrous effluxes of the precious metals,—of adverse exchanges and of

the necessity for discouraging undue importation; there our gigantic exports are contemplated with a peculiar pride, and a diminution in our imports is a subject of emphatic congratulation.

It is with no disrespect to the writer of this essay that we announce him as belonging to thinkers of this class. His knowledge of the subject is above that of nine-tenths of the writers who favour the public with pamphlets and books upon monetary and commercial principles. The student who is curious may here find an interesting analysis of the vast and complex transactions of England with foreign countries through the medium of bills of exchange, and may gain an acquaintance with the details of the subject that cannot be obtained from theoretical writers; but he will do well to fortify himself with a previous reading of Mr. Mill’s short but lucid exposition of the laws of the subject; or, better still, of Mr. Leslie Foster’s admirable Essay on the Exchanges between England and Ireland, published in 1804. With a very small acquaintance with such authorities, he will be able to smile at the present writer’s picture of a nation “permanently importing and consuming more than it is exporting and earning”—that terror of statesmen of the old school,—and will be in no danger of falling into the error of treating an exportation of gold as a national misfortune. That adverse exchanges, or a high price of foreign bills, is, if unexpected, highly inconvenient to a merchant who is compelled to remit is undoubtedly true, and that his loss in purchasing is only partially counterbalanced by the gain of others in selling such bills is equally undeniable; but it is extremely doubtful whether, under any circumstances, a country will really export a portion of the specie necessary for its own circulation.

Writers of this kind generally speak of the exports of a country as if they were a fixed quantity; but economists know that a high price of bills acts as a stimulus to exportation, which thereupon increases, and this, as ably demonstrated by Mr. Foster, not so much to recover as to retain the specie—in other words, the precious metals will as a rule only be exported, even to discharge liabilities, when there is no other thing in the indebted country which it would be as advantageous to export. When specie does happen to be the most profitable thing to export, that is, when the currency is really redundant, its exportation is of course a thing to be desired, for it is by such means that the precious metals find their level, and preserve that steadiness of value which fits them to serve as money. It is, however, a favourite theory in the “Bank Parlour” that it is the duty of somebody to intermeddle in this matter, and having determined by intricate inquiry the causes of an “unfavourable” state of the exchanges to apply the “correctives” proper to each case. This is the belief of the writer of this essay. He is anxious to impress upon the mercantile world the fact that there is a superintending power (he does not say where, but we shall not be far wrong in assuming that its throne is in Threadneedle Street) which is constantly watching the ebb and flow of bullion, applying stimulants or palliatives, and raising and depressing prices of commodities at will, for the good of the mercantile world. No reader of Mr. Tooke’s work need be told that the Bank has no such power; but, if it had, it is certain that any attempt to exercise it would be highly dangerous. It is quite true that when there is a great demand for loans, whether domestic or foreign, the rate of interest must rise, and that this rise will have a tendency to check exports, both of specie and other forms

of capital. The complaints of the mercantile world, on such occasions, of what is called the “Bank Screw” are, therefore, generally foolish and unreasonable enough; but if anything can tend to encourage their delusions it is the absurd claim set up by the Bank to be the fosterers and protectors of commerce; a delusion from which the “other establishments” which this writer calls upon to support his doctrine, have hitherto, fortunately, been free. The Bank is, we know, the inheritor of great traditions on this subject; and it is doubtless difficult for its chiefs to divest themselves of the cant phrases which once had a shadow of meaning; but since the charter of 1844, finally depriving them of all control over the issue department, the notion that they are different from any other trading corporation, or bound to conduct their business by other than mercantile principles, can have had no foundation. It is their duty at all times to employ whatever portion of their capital and deposits can be safely spared on the best terms they can obtain. A determination to raise the rate at which they will lend requires no apology, except the state of the market; but if the directors pretend that this determination to apply “the screw” is founded, not upon such considerations, but on a paternal desire to benefit by wholesome “correctives,” it is not to be wondered at that their patient will occasionally take his own view of the remedies applied. “Let alone” is the great and only safe principle of commerce; and no one who has studied the free-trade doctrine can have failed to come to the conclusion that it is quite as applicable to money and banks as to other things.

Marvels of Pond Life; or, a Year’s Microscopic Recreations among the Polyps, Infusoria, Rotifers, Water Bears and Polyzoa. By Henry S. Slack. (Groombridge & Sons.)

MR. SLACK would write much better than he does if his style were as Saxon as his name. As it is, we fear we cannot exclude him from the number of the English writers on natural history who have descended, it would appear, from Saxons, who must have been conquered by the Romans, and their mother-tongue suppressed or Latinized. This defect we regret sincerely, because it must abate somewhat of the cordiality with which we are desirous of recommending his book on account of the beauty of its illustrations, the study to which it may prove a help, and the interesting characteristics of its contents.

Not that we join in the indiscriminate and wholesale advocacy of the microscope, which talks of it as the indispensable companion of every intelligent and well-to-do family. The microscope tasks the eyesight severely. No man or maiden, lad or lady, whose eyes are already fatigued ought to use it. No doubt, Leuwenhoek and others preserved their sight to the end of their days; but Savigny and many other microscopists were plunged in darkness by its brightness. Nothing is more dangerous to the eyes than reflected light. “Many people fancy,” says Mr. Slack, “that the eyes are injured by the continual use of the microscope, but this is far from being the case if reasonable precautions are taken.” Yet far from being a fancy, the injury is only too well known. There is no use in calling a fact a fancy. If by “reasonable precautions” are meant efficient precautions the proposition is self-evident. Evaporation is continually drying up the liquid which lubricates the eyes, and it is not secreted in sufficient quantities to lubricate eyes which are over-fatigued simultaneously by reading and by reflected light, and hence come dimness and shortness of vision. Even

Mr. Slack deems it right to insert certain precautions in his book. All excess of light ought to be avoided; and the object brought into focus before it is steadily looked at. Both eyes ought to be kept open. Objects out of focus ought not to be stared at, because being indistinct the eyes injure themselves by striving and straining to see them. A screen made of cardboard covered with black or green velvet, ought to be used to keep out extraneous light. Green velvet will probably prove better than black: for the French picture critics, when their eyes are fatigued by gazing at miles of coloured canvases, find it refreshing to look occasionally at a bit of green silk or velvet which they carry about with them for the purpose. We may all of us find this precaution worth remembering with a view to the Exhibition of 1862.

Having cleared ourselves of responsibility in reference to the eyesight of our readers, we can now plunge into the "marvels of pond life" with a good conscience. There is a border or debateable region where the animal is scarcely distinguishable from the vegetable cell. Indeed, the learned differ respecting their distinctive marks; but the rule is a sufficiently good one, although somewhat difficult of application, that the absence of a stomach and the expulsion of oxygen gas mark the plant, whilst the presence of a stomach and the assimilation of oxygen gas characterize the animal. The difficulties in applying these tests arise chiefly from the state of science. Nature delights in blendings: and Science triumphs by separating the blendings of Nature. The plants and animals which make their appearance in infusions, have since the days of Needham been called Infusoria; and which of them are plants and which of them are animals in many cases the most acute physiologists, both botanical and animal, still find great difficulties in determining. Breaking the January ice of a small pond near Kentish Town, Mr. Slack drew up a skein of green threads (Conferve), and on taking it home for examination found upon it when under the microscope a number of Infusoria. There were Euglenæ, Vorticellæ and Rotifers. The Euglenæ are the green spindles, which are always changing their shapes; the caterpillar-like animals shoving themselves forward by bringing their heads and tails together are the wheel-bearers (*Rotifer vulgaris*), and the Vorticellæ or vortex-makers are those groups of tiny crystal bells appended to the threads of green Conferve, and jerking themselves up and down upon spirally-twisted stalks. The Euglenæ, or changing spindles, although sometimes called animals, are probably plants evolving oxygen. The living things found in infusions are the simplest plants and the simplest animals; and, of course, the grouping of them under the name of Infusoria was due to convenience, and not to science. Some of the Euglenæ may yet prove to be plants and some of them to be animals. But the vortex-makers are clearly enough upon the animal side of the boundary, for they possess an intestinal canal. When their bells are tolerably large, a dark ground illumination displays them "shining with a pearly iridescent lustre," and their cilia "flashing with prismatic colours." The bells are covered with retractile lids. Some of these vortex-makers, putting forth cilia from their bases, can quit their stalks and swim about freely. Moreover, they can secrete a gelatinous cover or cyst, and assume the shape of pears, or trumpets on short stalks. When they have been fed with indigo or carmine, the spaces into which their food passes can be clearly seen.

The Rotifer, or wheel-bearer, is a much higher animal than the vortex-maker. Not content with pushing herself forward like a caterpillar,

the wheel-bearer can moor herself by her tail-foot, or putting forth cilia looking like revolving wheels swim about at will. Whilst swimming with her wheels going, and her tail pulled in and out like a telescope, a whirlpool is produced, which sucks her prey into her ravenous maw and busy gizzard. But, she has a still more curious characteristic. There is seen in her inside a small wheel-bearer, another and a smaller self, equally active in thrusting forth its cilia, and in working its gizzard or mouth. This is a case not of a wheel within a wheel, but of a wheel-bearer within a wheel-bearer. Mr. Gosse contends that the gizzard is a mouth with hammers for teeth, which masticate by beating the food upon a sort of anvil.

Breaking the ice of a pond on Hampstead Heath, our microscopist looks up some water-plants, upon which he perceives several polyps or hydras with their poison threads or stings. The sunshine of March brought to the surface for him a rotifer like a live transparent soup-plate (*Pterodina patina*); a carapaced wheel-bearer, which had a forked jointed tail and a pickaxe snout (*Metopidia acuminata*); vortex-makers jerking up and down in crystal vases like jack-in-the-box (*Cothurnia imberbis*); and *Salpina redunda*, a rotifer with a carapace like a three-sided glass box slightly open along the back. April supplied the Floscules, brownish egg-shaped things in transparent jars, to the bottoms of which they are attached by their tail-feet. For May the marvel was the *Meliceria ringens*. This tube-dwelling wheel-bearer moulds its own bricks and builds the tower in which it dwells. Standing upon a footstalk the meliceria thrusts out of its tower four leaves surrounded by cilia. Between the leaves, Mr. Gosse observed an instrument, like the circular ventilators of windows, containing a cup-like mould which makes the bricks. A stream of small particles is directed into the mould by ciliary currents. Particles which are too large and unsuitable are rejected, and the suitable particles are cemented into conical pellets and squeezed in close-fitting octagonal shapes in the wall. Prof. Williamson says the meliceria forms first of all a hyaline cylinder, and deposits the first row of pellets around the middle of it. The pellets are laid like beads by the head, which resembles a flower with four unequal petals; and the pellets are held in the mould until fixed into the rows which are simultaneously built upwards and downwards. A kind of vortex-maker, which rests upon a pillar is called Epistylis; and a species of vortex-maker resting upon something like a tree, is called *Carchesium polypinum*. August supplied wheel-bearers with carapaces like pitchers (*brachionus*); three-limbed wheel-bearers (*triathra*); and cryptomonads, or round disks, moved along by whisking whips. For September, the wonder is the crown-bearing floscule (*Stephanoceros Eichornii*); which is perhaps the most beautiful of the rotifers. The account which Mr. Slack gives of this animal is a favourable specimen of his style:—

"In this elegant creature, an oval body, somewhat expanded at the top, is supported upon a tapering stalk, and stands in a gelatinous bottle, composed of irregular rings, superimposed one upon the other, as if thrown off by successive efforts, the upper ones being inverted and attached to the animal. But that which constitutes the glory of this little being is a crown of five tapering tentacles, each having two rows of long cilia arranged on opposing sides, but not in the same plane. The ordinary position of the tentacles is that of a graceful elliptical curve, first swelling outwards, then bending inwards, until their points closely approximate; but each is capable of independent motion, and they are seldom quiet for many minutes at a time. The cilia can be arranged in parallel rows

or in tufts at the will of the creature, and their motion appears more under control and susceptible of greater modification than the ordinary Infusoria. The Stephanoceros is a member of the Floscule family; but in all the specimens I obtained and watched for several weeks there was an important difference in the relation of the tube to the creature. In the Floscules, I had never seen anything like an adhesion between the tube and the animal; but in the Stephanoceros I noticed it continually, and always in the manner described. Like the Floscule, the Stephanoceros is readily alarmed, and retreats into her house, carrying with her the invaginated portion. In the last edition of Pritchard's 'Infusoria,' this case is spoken of as apparently not tubular, but a solid gelatinous mass enveloping the animal as high up as the rotatory arms. It is very likely that specimens at different ages, and possibly at different seasons, may vary in the structure of their abodes; but I am not able to concur in the preceding account, as all the tubes I examined resembled sacks turned in at the mouth, and attached to the shoulders only of their inmates; and on one occasion I was able to look down into a deserted tube, which had not collapsed, as it would have done if it had been merely a solid gelatinous mass. * * * When well exhibited, the tentacles have a lustre between glass and pearl; the body in a favourable specimen is like a crystal cup; and the food, usually composed of small red and green globes, glows like emeralds and rubies, as if in the height of luxury the little epicure had more than rivalled Cleopatra's draught, and instead of dissolving, swallowed its jewelry whole. So lustrous and varied in colour is the whole appearance of the animal under these circumstances, that it is frequently alluded to by one of our first artists to whom it was displayed."

Trumpets (*Stentors*) abound in October. They are of different hues, and the green ones owe their tint to vesicles full of the colouring matter of plants. When stretched out they look just like the post-horns still to be seen and heard in old-fashioned towns. "Another little curiosity," says Mr. Slack, "was a transparent cup upon a slender stem, which stood upright like a wine-glass, and supported on its mouth a transparent globe. It was found to be a Vorticella, and after two hours the globe was partially drawn in, and reduced in size."

When examining some small branches of Anacharis in a glass trough a tiny puppy-like creature was discovered pawing along upon eight imperfect legs, with more show than go, or in the Roman tongue, with more action than progression. This was one of the slow-stoppers (Tardigrada), or water-bears. Of this bear-cub, each of the eight legs was provided with eight serviceable claws. He had no tail. His blunt head could alter its shape considerably. From the front of the gizzard proceeded two rods meeting in a point representing, it is supposed, the jaws of insects, with a tube for the food between them. The mouth is suctorial and the rods are protrusile. They are frequently brought out as far as the lips of the mouth, which protruding with them becomes a small round pouting orifice. The water-bears have no eyes, or only "variable and fugacious" ones. Like the Rotatoria, they are destroyed by immersion in boiling water; but they can be revived after being in water gradually heated from 252° to 261°. Capable both of enduring heat, and of complete resuscitation, they can revive as if nothing had happened, after being baked by the sun's rays upon the roofs of houses where they undergo the changes of the weather and every alternation of drought and of wet.

James the Fifth; or, the Gudeman of Ballan-geich, his Poetry and Adventures. By James Paterson. (Edinburgh, Nimmo; London, Simpkin & Co.)

In the picture by Maubeuge, representing three of the children of Henry the Seventh,—namely,

Arthur, and the racter of faithful Vertue, succeeded scholar so of the Excalibur, showing the app the seats for which hooded, she has double in either holds on strong c Henry's Margara mother satiate. more. (training grandm at her c silver h pieces. the Fou wedding Kilmar of than he had that dis queathe jewels, that th howeve legacy fatal ho the Sco gnet's) The Douglas was mo the uni the life obscure and from she sau after ai Seotland sensation Douglas by Mar abused called the ty James the nat boy-kin Whe 1513, I more th little p sought He wa and hi longest ruin t Before he was a few thrakld do ill. pure-n captivi blood him; rely o

Arthur, Prince of Wales, Henry, Duke of York, and the Princess Margaret, the individual character of each child is artistically preserved, and faithfully rendered too, in the engraving by Vertue. The eldest boy, heir destined not to succeed to his inheritance, wears a sedate and scholarly look, a little priggish, if one may say so of the little namesake of him who wielded Excaliber. His brother, Henry Tudor, more showily attired, quietly extends his hand towards the apple lying on the table, at which all three are seated, as if it were the globe of sovereignty for which he was destined. But, look at that hooded, kerchiefed, ermined, buxom Margaret; she has more than twice the vivacity of action, double the liveliness of look, that can be traced in either of her brothers. In her left hand she holds one apple, and with her right indicates a strong desire to obtain the fruit towards which Henry's hand is extended. It was ever so with Margaret. The sister of Henry Tudor and the mother of James the Fifth of Scotland was insatiate. Enjoying much, she was hourly craving more. Yet this defect was more the result of training than a development of her nature. The grandmother, whose name she bore, not content, at her christening, to put before her a gorgeous silver box, must needs also fill it with gold pieces. When Margaret was married to James the Fourth, and the king gave his bride, as a wedding present, the title-deeds of the lands of Kilmarnock, she took the paper, and in place of thanking him, plucked his beard, as though he had not been sufficiently liberal. Then came that disastrous will of Prince Arthur, who bequeathed to his sister Margaret, not only his jewels, but his clothes. Some writers assert that the testator was Margaret's father, but however this may be, the non-payment of the legacy was one of the causes which led to the fatal hostility with England, which resulted in the Scottish overthrow, and the death of Margaret's husband, at Flodden.

The royal widow of 1513 was the wife of Douglas, Earl of Angus, in 1514, by whom she was mother to Lady Mary Douglas, of whom the unfortunate Lord Darnley was the son. In the lifetime of Angus, Margaret married the obscure Henry Stewart, a son of Lord Evandale, and from that time her influence declined, and she sank into permanent contempt and oblivion, after aiming at a fourth marriage. Meanwhile, Scotland was torn by the pretensions and dissensions of Angus and Arran, heads of the Douglasses and Hamiltons. The regency, lost by Margaret, and ill exercised by Angus, was abused by the Duke of Albany, who was twice called to power. The weakness of this French-born prince was as calamitous to Scotland as the tyranny of Angus; and the non-age of James the Fifth was a period of calamity to the nation and of misery and temptation to the boy-king.

When James the Fourth fell at Flodden, in 1513, his son, James the Fifth, was something more than a year old. During his infancy, his little person was contended for by nobles, who sought through him to aggrandize themselves. He was alternately lost and won, but Angus, and his cousins of Douglas, held him for the longest period, and did their very utmost to ruin the boy, that they might profit by it. Before he had accomplished his thirteenth year, he was placed, poor puppet, on a throne. For a few years, he was subjected to intolerable thralldom, and a most insidious temptation to do ill. Had the boy not been quick-witted and pure-minded, he would have sunk into hopeless captivity, uncleanness, and idiocy. Much blood was shed by his friends in order to rescue him; they all failed, but the lad resolved to rely on himself alone, with the aid of some

two or three faithful servants. Accordingly, one night, he escaped from Linlithgow to Falkland; and, in 1528, the royal stripling sent forth from that seat of safety the decrees which brought down ruin on the Douglasses; and he there commenced a career which gained for him the loving name of "King of the Commons."

For wisdom and justice, if the chronicles may be believed, he was a very Solomon. He crushed alike the proudest nobles in their strongholds, and the banditti who roamed over and devastated the land. He hunted down the famous Johnnie Armstrong, and was strong enough to give much vexation and infinite disgust to his unscrupulous uncle, Henry the Eighth. Even in his passionate pursuit of manly sports, he never neglected a duty, and however he might be engaged, it was popularly said of him that his eye was everywhere. His most intimate friends were literary men or men who loved literature. He was surrounded by poets, and known to sweep the lyre himself. An acceptable tradition points to him as the author of that lively May-day ode, 'Christ's Kirk on the Green'; the character song of 'The Gaberlunzie Man'; and the comic but not too delicate ballad, 'The Jolly Beggar.' Though this last falls short of the merit assigned to it by Scott, it might very well have been written by a gallant monarch, very much addicted to transgress in his duty towards his neighbour by falling in love with his neighbour's wife:—

"Of the King's nocturnal adventures much has been said in a general way; but particulars are sadly wanting. The incidents in 'The Gaberlunzie' and 'The Jolly Beggar,' are in all likelihood founded upon real occurrences. Tradition has furnished the romancer with the groundwork of many stories in which the King figures as a principal character; but it would be in vain attempting to trace their foundation in truth. When travelling incognito, he generally assumed the title of the 'Gudeman of Ballengeich,' from a steep path leading to the town of Stirling, on the north-west side of the Castle, which still bears the name. *Gudeman* was usually applied to a class of small proprietors who held, not from the crown, but from a vassal. But James did not always travel for the purposes of gallantry and the love of personal adventure. The administration of justice was frequently dealt summarily and effectively under the cloak of adventure, and he has sometimes been known to attack banditti singly, or, at least, with a few of his courtly attendants. Sir Walter Scott has very happily introduced the King, as traditionally portrayed, in 'The Lady of the Lake,' in which the famous single fight occurs between him, as Fitzjames, and Rhoderick Dhu. Another tradition has been wrought into the excellent little drama of *Cramond Brig*, by the late Mr. Murray of the Theatre Royal Edinburgh. The character of the King is here brought fairly into play—his love of justice as well as his love of adventure, although perhaps the dramatist may have twisted the tradition a little to suit the purposes of morality and effect. Scott, in his notes to 'The Lady of the Lake,' relates the circumstances somewhat differently, making the King the suitor of the pretty girl. 'Four or five persons,' he says, 'whether relations or lovers of his mistress is uncertain, beset the disguised monarch, as he returned from his rendezvous. Naturally gallant, and an admirable master of his weapon, the king took post on the high and narrow bridge over the Almond river, and defended himself bravely with his sword. A peasant, who was thrashing in a neighbouring barn, came out upon the noise, and, whether moved by compassion, or by natural gallantry, took the weaker side, and laid about with his flail so effectually, as to disperse the assailants, well thrashed, even according to the latter. He then conducted the King into his barn, where his guest requested a basin and towel, to remove the stains of the broil. This being procured with difficulty, James employed himself in learning what was the summit of his deliverer's earthly wishes, and found

that they were bounded by the desire of possessing, in property, the farm of Braehead, upon which he laboured as a bondsman. The lands chanced to belong to the Crown, and James directed him to come to the palace of Holyrood, and inquire for the "Gudeman of Ballengeich." He presented himself accordingly, and found, with due astonishment, that he had saved his monarch's life, and that he was to be gratified with a crown-charter of the lands of Braehead, under the service of presenting a ewer, basin and towel, for the King to wash his hands, when he should happen to pass the Bridge of Cramond." The Howiesons of Braehead, whose representatives still possess the property, hold it upon the tenure represented, and this service was performed by William Howieson Crawford, younger son of Braehead, when George IV. visited Scotland in 1822."

There is no doubt that the king's life at this time abounded in romantic incidents. Princesses, despite his too gallant reputation, perhaps because of it, sighed for him; one, a disappointed daughter of the Duke of Vendôme, died for him. His wooing, winning and wedding of the daughter of the King of France, the fragile Magdalene, and her sudden, yet not unnatural death, as she stepped on Scottish ground, comprise details enough for a romance full of tender and chivalrous sentiments. The young husband mourned for his pearl of France like a true lover; and he personally wooed no second lady. His next wife, Mary of Lorraine, or of Guise, widow of the Duke of Longueville, was sought and was married by proxy. That he was hardly prepared to push his own suit is clear from the fact that within a few weeks of Magdalene's demise, the royal ambassadors were asking for Mary. When the latter became his second consort, in January, 1538, his first had not been full six months dead. It was almost a case of furnishing the marriage-table with the cold viands left of the funeral banquet held at the burial of the earlier bride.

Mr. Paterson defends James, with some success, against the charge of parsimony, and apologizes for, rather than explains, his policy in respect to his opposition to the Reformation. Knox denounced the latter, and saw in the early deaths of the king's two sons an evidence of divine retribution. Meanwhile came the fatal rupture with England, the proximate causes of which may be said to have been the assumption of the title of 'Defender of the Faith' by Henry, and the favourable consideration by James of the offer from the Irish to accept him as their king. There were other and perhaps more real reasons, but any would have sufficed to bring about the final catastrophe, in which neither party gained more than a moderate crop of laurels. Norfolk invaded Scotland only to retreat from it; and James sent an army into England, only to find it in mutiny against the plebeian leader whom he had appointed in order to deprive the nobles of the glory of victory. Of the disorganized state of his forces the English took ample advantage, and James was brooding over their ruin, in Falkland Castle, where he had first tasted freedom, when news was brought him that the Queen had given birth to a girl in Linlithgow Tower: "A lass!" exclaimed the disappointed monarch, who longed for a son, who might one day avenge him, "It came wi' a lass, and it will pass wi' a lass." The cause of Scotland might have been saved by a man, or won by a woman, had the nobles been less selfish and more patriotic; but these disloyal men took advantage of the "lass," Mary Stuart, whose birth was greeted by such a sour, though paternal, prophecy. A son of James might have raised the thistle about the rose, and he had no less than six of them, but they were all illegitimate, and like the scourges which are

said to be sometimes made out of pleasant vices, they were heavy inflictions, if not on their sire, on poor Scotland, for the eldest, James, was the grim Regent, Murray, and the third, John, Prior of Coldingham, was father of Francis, Earl Bothwell.

This memoir is almost entirely personal. James is the only important figure in the picture. The others are merely accessories. The Beaton, the Douglasses, the Lindsays, even Mary of Guise, are but dimly shadowed forth. The biographer too is, perhaps, a little too much in love with his hero, yet he defends him not passionately, but with some show of argument, not denying his errors, but pointing out how they were often the results of his early training, and suggesting that whatever might be their amount or their gravity, they were venial in the light of his intellect, his good intentions, and his substantial virtues. Margaret, his mother, was not a beneficent queen to Scotland. In the daughter of her son and the son of her daughter,—the first, Mary Stuart, the second, Lord Darnley,—Scotland had reason to rue as well as to remember, her marriages alike with James the Fourth and the Earl of Angus.

History of the Commerce and Navy of Belgium
—[*Histoire du Commerce et de la Marine en Belgique*, par Ernest van Bruyssel.] (Brussels, Lacroix; London, Nutt.)

For the last half-century History has dwelt chiefly on the efforts that have been made by European nations for the advancement of their material prosperity, commercial and industrial. Never before was so much activity displayed in furtherance of this object. Electricity and steam have given an impetus to the efforts of the people, and the result must be a revision of the laws of commerce and a reform of the tariff. The division of labour, which has only been applied hitherto to individuals, must from henceforth be made applicable to nations. But in order to understand what objects are more especially adapted for the purposes of trade and commerce, we ought first to acquaint ourselves with the past traffic and navigation of each nation.

This is what M. van Bruyssel has attempted to do with regard to Belgium, from the time of Cæsar to the downfall of the Low Countries in 1830. He has shown how much a small population gifted with perseverance and energy may effect in a few centuries. He begins by describing the knowledge possessed by the Morini, Menapii, and others on the coast, in working iron, making cloth, colouring wool, and in manufacturing different varieties of tissue. The inhabitants of these countries were also good sailors, and at a very early period established Belgian colonies in England. When the Romans came, they found many of these colonies in Kent, Sussex, Surrey and elsewhere; the *Venta Belgarum*, which became the modern Winchester, was the centre and chief of these establishments. Mr. Wright in his history has shown that the Menapii went even to Ireland for commercial purposes at that remote period.

The conquest of Gaul by Cæsar put an end to this commercial activity, and it was not until long afterwards that the Belgians were again permitted to pursue their industrial occupations. The law prohibited the importation of certain products into Belgium, such as wine, oil and iron. The author here gives a detailed account of the different articles furnished by the Low Countries to Rome under the Emperors.

At the decline of the Roman Empire there was a long period during which commerce and literature were at a complete standstill in the north of Europe. Under Charlemagne new

regulations gave a fresh impulse and vigour to trade. It was then that, for the first time, was established the uniformity of weights and measures. Under his son, Louis the First, we find Ostend mentioned as a small seaport. Ships of various kinds were already made use of for commercial as well as for warlike purposes, all of which are carefully described in the work before us.

In the ninth century, says Sigebert de Gembloux, Antwerp had already attained a certain importance as a place of traffic. Anderson, in his 'History of Commerce,' shows that the Flemings had, from the year 836, held an interchange of products with Scotland, which the Scots found very advantageous, especially for the sale of their salt fish. The inhabitants of Aldenbourg were, even at that time, in the habit of going regularly into Wales on fishing excursions, killing their fish with lances and arrows. About a century later, Baldwin the Third, Count of Flanders, instituted regular annual fairs in all the principal towns, which attracted a great many foreigners, and were instrumental in making Bruges, Courtrai, Calais, and Thourout very prosperous cities.

To prove the prosperity produced in Flanders by commerce, it suffices to show that twelve or fourteen rich Flemings helped William of Normandy in his conquest of England, by supplying him with soldiers, ships, and money. Among other names cited we find Gilbert of Ghent, Philip and Humphrey of Courtrai, Bertrand of Melle, Richard of Bruges, and many more. M. Thierry is wrong in saying, in his 'History of the Conquest of England,' that the Count of Flanders refused all assistance to William. The latter even promised to pay his father-in-law an annual rent of 300 marks in silver as the price of his supplies. This is stated by the English historian Malmesbury, and the Flemish chroniclers Meyer, Oudegherst, and Despars. Twenty ships were equipped by Flanders for this expedition. After the conquest many Saxons of noble birth took refuge in the Low Countries, and among others, the mother and the sister of Harold. It is to be regretted that M. van Bruyssel has not alluded to the latter, as her tomb, with an inscription giving the details of her sorrows, was found some years ago among the ruins of the Church of St. Donat, in Bruges. This circumstance was well worth mentioning.

In such warlike times there were no laws for the regulation of commerce. The first appears in the eleventh century after the conquest of Jerusalem by Godfrey of Bouillon. He established what are called the *assizes of the kingdom of Jerusalem*, the second part of which relates entirely to the rights and duties of maritime transactions.

Under Henry the First of England a considerable number of Flemish manufacturers and tradesmen settled in Pembrokeshire, where they constructed a road of great extent, called *Flemings' Way*, to facilitate traffic. Their cleverness in weaving wool and flax was so remarkable that Gervasius, in his Chronicle, says that it was in them an inborn gift of nature. Tytler, in his History of Scotland, tells us, also, that the influx of Flemish merchants at the end of the twelfth century was one of the great causes of wealth in that country; and Macpherson, in his 'Annals of Commerce,' states that they were the first who introduced the cultivation of flax and hemp into England, as is mentioned in a charter of Westminster, in 1175.

A little later we find that some of the cities of Flanders possessed the largest emporiums of merchandise to be found in all Europe. William the Breton thus describes in his poem of the 'Philippides' the amount of wealth in the

harbour of Damme, when Philip Augustus, King of France, came to attack Flanders with 1700 ships. He speaks of the port of Calais:—

The merchandise brought there by foreign vessels exceeds all belief. Masses of bullion, heaps of oriental wools, wax, cloths, Hungarian furs, grain, wines from Gascony, iron, and other metals, and a number of other products from England, which were collected at Damme preparatory to exportation into other countries, bringing large profits to speculators.

M. van Bruyssel gives interesting details on the forms of the different vessels in the thirteenth and fourteenth centuries, and on the commercial relations between Belgium and Europe during the same period. England, Scotland and Ireland traded with the Flemings in wools, leathers, lead, coals, cheese and salt. They received from Norway various sorts of birds; from Denmark, horses; from Russia, furs; Bohemia, Hungary and Poland sent wax and gold and silver ingots; from Aragon came saffron, rice, almonds, &c.; from Germany wine, corn and iron. Fez, Tunis and Morocco traded in furs and sugar; Constantinople in alum and fruits; Egypt in spices; and from Palestine, Armenia and other parts came silks and gold and silver cloths.

The researches made by the author are very considerable. His long residence in London enabled him to examine our repositories of ancient documents; and the reader will be rewarded for perusing this book, more amusing in parts than many works of fiction, and replete with information hitherto but little known to the public.

Occasional Productions, Political, Diplomatic, and Miscellaneous. By the late Richard Rush. Edited by his Executors. (Philadelphia, Lippincott & Co.; London, Trübner & Co.)

THE synopsis of familiar letters, addressed by Washington to his private secretary, Col. Lear, to which great prominence is given in this volume, adds little to our knowledge of the General's character, and nothing to the recorded facts of his biography. Still the fragments possess a certain interest. There are the usual domestic details concerning stoves and curtains, harness and lusters, mangles and cut-glass decanters; for, as the Correspondence already published shows, Washington was minutely careful in the management of his household affairs. All great men, said Mr. Rush in his commentary, have been similarly precise and provident:—Cæsar, Cromwell, Napoleon, Frederick, Peter, Marlborough, and Alexander,—and, he might have added, Wellington. But why apologize for Washington's taking thought of small things by reminding us that Frederick the Great troubled himself about the price of coffee,—that Napoleon played at blindman's buff,—that Cromwell is said to have thrown a cushion at Ludlow,—and that Peter of Russia had a pet monkey! These anecdotes, apocryphal or not, are wholly irrelevant. Mr. Rush was old enough to remember having seen Washington at the Capitol. But his personal reminiscences of England and France, though the merest possible gossip, will be more attractive to the majority of readers than his purely American chapters. We are not sure that his executors do his memory any credit in publishing them; since they were merely epistolary, being contained in letters addressed to his wife. Mr. Rush describes at length his visit to Grove Park, the seat of Lord Clarendon. Also, a Christmas at Hagley, the semi-feudalism of manners in the country, at Holkham especially, having apparently fascinated him. He writes

as a traveller in an unknown region. A dinner to which he refers took place at the Marquis of Lansdowne's house, at the time of the accession of Queen Victoria to the throne. Mr. Rush was among the guests. The death of the King was then announced, and contradicted. Next day, at Lord Clarendon's,—

"Before it was all over, I was drawn in, whether or not, to say a little in turn. The important points of the story of the day told, and the dessert course finished, our accomplished host, addressing himself to me, with his mild expression of countenance tinged with archness, blandly remarked, 'How sadly you in your country have departed from the example of your good old English stock!'—'How?' I asked.—'How?' he replied: 'why, could you elect a Lady, President of the United States?' This was something of a posing question under the event and topics of the day. I sheltered myself by saying it was a constitutional question we had not yet raised.—'Ah,' he said, 'you know you could not; but we in old England can now call up the classic days of our good Queen Anne, and the glories of Elizabeth; but as for you, you are in love with that Salic law—you will have none but men to rule over you; no lady, however beautiful or accomplished, can you ever put at the head of your nation, degenerate race that you have become!' It was so he pushed me. I parried his thrusts as well as I could. Then he varied the attack. 'And what a hubbub you made for a year before electing Mr. Van Buren President. See how quietly a Queen comes to our throne! Walk the streets, and you would not know of a change: to-morrow will be as yesterday, except that everybody will have a joyous face at the thoughts of a young Queen. We shall all be proud to look up to her; honoured when allowed to kiss her fair hand at the drawing-room; happy even to have our ears boxed if we deserve it!' It was so he went on in a vein of badinage. The occasion was not one for political dissertation. I stuck to my country by saying, that if we could not elect a Lady, President, I hoped we should have credit for keeping up the character of our English descent by doing pretty well in other things on our continent. None of the company dissented from this: least of all Lord Clarendon himself, who had been running me so hard, though so playfully. And thus passed off this pleasant little dinner-party and talk about Queens and Presidents."

This is a fair specimen of the familiar correspondence which the executors of Mr. Rush have thought fit to publish.

OUR LIBRARY TABLE.

The Natural History of the Tineina. Vol. VI., containing *Depressaria*. Part I. By H. T. Stainton. (Van Voorst.)—With the regularity of the seasons appears the annual volume of Mr. Stainton's curious elaboration of minute entomological study; and so closely does each succeeding portion of the work resemble its predecessor, that it is difficult to find any new object of criticism, any defect or excellence in one volume which does not equally exist in every other. There is, however, one defect running through the whole work, which even now it is not too late to supply. We would suggest the great utility of magnified representations of those points of structure upon which the generic distinctions are based; and this, as it appears to us, may be easily done by means of an occasional supplementary plate, distinguished from the others by letters instead of numbers. With this addition, the work, as far as its limited object goes, would, we conceive, be perfect. The present volume includes some forms, which, as Mr. Stainton observes, approach the Tortricine; and this not only in their larger size and the greater expanse of the wings, but also in the characters of the larvae. Is Mr. Stainton right, therefore, in considering this similarity as merely "superficial"? The characters derived from the structure of the larva in the Lepidoptera formed the basis of a very learned and profound generalization by one of the most thoughtful naturalists of his day, the

late Dr. Horsfield; and it may be worth Mr. Stainton's while to examine with some care the relation of conterminous groups with reference to this phase of their economy.

Monography of the Genus Conus.—[*Monographie du Genre Conus*, par Le Chevalier A. Bernardi, accompagnée de deux Planches Coloriées. (Paris, Rothschild.)—The genus *Conus* occupies a conspicuous place in Conchology. Cones are so common that almost every mantelpiece has one or more amongst its familiar ornaments, and so rare that almost every collector's cabinet is wanting in some of the species. Sixpence will purchase a cone of one kind, while six guineas has hardly sufficed for one of another. The caprices of conchological fashion are discoverable in the varying market values of the rare species of cones. The value of the *Conus Cedo nulli* has, within our own observation, varied by several pounds, at different sales, in the same auction-room. At present, its price belies its name, for there are other species to which it must yield in money value. When one of these latter is brought forward for sale, it is curious to note the apparent insignificance of the shell as compared with the increasing biddings; and the ordinary spectator might well marvel at the high value set upon a tiny cone, in comparison with which he would, perhaps, think the large cone on his own chimney-piece far more remarkable. In Mr. Sowerby's monograph of this genus, he describes 404 species. M. Bernardi affirms that even this large number may be added to; and that, while some species were admitted by the English conchologists, others have been described since the appearance of his Monograph. Another French writer is about to issue a catalogue of all the species of this genus, and they will amount in all to 450. Were the whole displayed in one cabinet, it would form a sight to stimulate the dullest into conchological curiosity. The French Monograph before us is designed as supplementary to the monographs of Sowerby, Reeve and Kiener. The species in the two plates are beautifully represented.

Dear Old England: a Description of Our Fatherland. By Jane Anne Winson. (Seeley & Jackson.)—This work is intended as a book to be read in or out of school. It contains an account of the various counties of England, arranged in a geographical order, from north-east to south-west, beginning with Northumberland and finishing with Cornwall. Of course, the subject is a wide one, and the author has great opportunities of selection. It would be impossible in such a case to suit every taste. Each person will turn to his own county, and find something omitted. On the whole, we think the author has succeeded in writing a book that will excite in young minds a desire for further information on the history, geography and objects of natural interest in their own country.

The Silver Cord, a very curious and powerful story, by Mr. Shirley Brooks (Bradbury & Evans), has been republished from "Once a Week."—*Irish History and Irish Character*, by Goldwin Smith (J. H. & J. Parker), is the enlargement and reproduction of a lecture, and in *Memoriam*; being a *Memoir of the late W. Newton (Folkard)*, is also reprinted from the pages of a contemporary.—Messrs. Hurst & Blackett have added to their "Standard Library" Miss Freer's *Life of Jeanne D'Albret, Queen of Navarre*.—Mr. Bohn has added to his "Illustrated Library" *Southery's Life of Nelson*.—Second editions of *Our English Home*; its *Early History and Progress* (J. H. & J. Parker),—*Misrepresentation: a Novel*, by Anna H. Drury (Chapman & Hall), have appeared.—We have likewise on our table a third edition of Dr. Taylor's *Climate of Pau*, &c. (Churchill),—a sixth edition of Mr. Chavasse's *Advice to a Mother on the Management of her Offspring* (Churchill),—an eighth edition of Mr. Aston's *Income-Tax Tables* (Passmore),—an eleventh edition of *Cornish's Guide to Birmingham* (Cornish).—In this connexion we may announce *Mair's School List for 1861*, edited by R. H. Mair (Mair & Co.),—and *Old Moore's Almanack for the Year 1862*.

LIST OF NEW BOOKS.

Adam's Schoolboy Honour; a Tale of Halmsthorpe College. 3s. 6d.
Bell's Road to Wish, and How She Attained It. 12mo. 4s. 6d.
Buildings designed for the International Exhibition of 1862. 1s. 5d.
Cheverel on Colours, illustrated, new edit. 8s. 5s. 6d.
Cleghorn's Forests and Gardens of South India. 2nd ed. 12s. 6d.
Collins's Hide and Seek, new edit. crown 8vo. 5s. 6d.
Crombie's Broom: its Topography & Nat. Hist. 8s. 5s. 6d. cl.
Existence of God: a Discussion, at Wigan. 12mo. 1s. 5d.
Fraser's Baptism: a Letter to Spurgeon. 8s. 5s. 6d. cl.
Gangee's Our Domestic Animals.—Organs of Digestion. 8s. cl.
Giles's Village Sermons, preached at Belleau-with-Aby. 8s. 5s. 6d.
Hamilton's Metaphysics & Logic, ed. Mansel & Veitch, 2 ed. 9s. 6d.
History and Articles of Masonry, ed. by Cooke, royal 16mo. 7s. 6d.
Knapp's God's Word and God's Works, 8s. 5s. 6d.
Knowles's Notes on Epistles to Hebrews, with Analysis, &c., 6s. 6d.
Milne's Life in China, new edit. 8s. 5s. 6d.
Personal Piety: a Help to Christians. 3mo. 1s. 6d. cl.
Preston's Illustrations of Masonry, Additions by Oliver, 17 ed. 9s. 6d.
Ryder's Visible Church, and no Invisible Members, or 8vo. 4s. cl.
Stephens & Burn's Book of Farm Buildings, royal 8vo. 12s. 6d. h.f. bd.
Trench's Sermons preached in Westminster Abbey, 2 ed. 8vo. 10s. 6d.
Trollope's Commentary on Liturgy and Ritual, crown 8vo. 5s. 6d.
Veterinary Directory, 1861. 12mo. 5s. 6d.
Walsh and Lupton's The Horse, illustrated, 8s. 12s. h.f. bd.
Warter's "Wise Saws and Modern Instances," 16mo. 5s. cl.
Wilkinson's Remarks on Prophecy. 12mo. 1s. cl.
Woodgate's Essays and Reviews Considered, 8vo. 5s. cl.

NEW GEOLOGICAL SKETCH MAP OF SCOTLAND.

Geological Survey Office.

In the last number of the *Athenæum* the new 'Geological Sketch Map of Scotland,' by Mr. Geikie and myself, having been noticed, you mention that the cover of the map has my name only on it. You then justly add, that as I had candidly announced that the map had been prepared by Mr. Geikie, "it seems hardly fair to the younger and less-known geologist to send forth the map thus lettered." Allow me to state, that as soon as I received the first copy from Edinburgh I was much annoyed at the blunder of the binder, and immediately wrote to Mr. A. Keith Johnston, the publisher, to have the name of my coadjutor added. This was done immediately; and, with the exception of a very few copies, of which, unluckily, you received one, Mr. Geikie's name is as prominent on the cover as it is in the title of the map. Again, I beg to state that in the explanation of the map, I have given the warmest praise to Mr. Geikie for his labours.

As you express your regret that the map was not published on a larger scale, you must allow me to say, that although we much wished to follow that course, we found it to be impracticable to enter into greater detail in reference to the larger half of Scotland, where the outlines of the several formations are not yet defined, and of which no good maps exist. Our little map, which is issued at a very small cost, and explains the general structure of the country by coloured sections on its sides, is simply intended to serve as the basis of a new and reformed classification of the Scottish rocks; the more detailed elaboration being deferred until the Ordnance Survey is much more extensively applied.

As you allude to two or three of the years only in which I have been employed in Scottish exploration, I beg to say that the summers of 1826, 1827, 1850, 1855, 1858, 1859 and 1860 were devoted to that object; my new 'Geological Sketch of the Highlands,' as published in the *Journal of the Geological Society*, 1859, having been the groundwork of the present map of Mr. Geikie and myself.

RODGERICK I. MURCHISON.

OUR WEEKLY GOSSIP.

SOME months ago M. Du Chaillu publicly desired his critics to suspend their judgments of him, and of his book, until such evidence of the good faith of his narrative as he could procure from the Gaboon river should arrive in London. His critics have waited, and they not unreasonably ask for his reply. Has that evidence come to hand, and will he produce it? That time enough for communication has been allowed we know. Six or seven months ago M. Du Chaillu came to England, and seventeen weeks have elapsed since we reviewed his 'Explorations and Adventures in Equatorial Africa.' The Gaboon river does not flow at the extremity of the earth. In fact, it is known to many persons, and we suppose to M. Du Chaillu amongst the number, that the book of 'Explorations and Adventures' has been read at the Gaboon and has produced a very lively sensation there. Will M. Du Chaillu tell us what is said about his "Adventures" on the spot to which he appealed for corroborative evidence? Letters came to town

from the Gaboon on Wednesday last. A gentleman, who has been conspicuously named as a witness for M. Du Chaillu, has written on the subject to his friend in London:—will M. Du Chaillu produce the letter so sent? We hope he will. The public have waited long; and they have a right to be satisfied, if it is now in M. Du Chaillu's power to satisfy them, of the reality of his explorations, if not of the literal accuracy of his text.

The mystery about the Messrs. De Schlagintweit seems to deepen. What is the truth? Who were their scientific patrons? Last week we printed explanations from Sir Roderick Murchison and General Sabine, which contradict, in the most important details, statements made by the travellers in their recent book. Sir Roderick altogether negatives, and General Sabine greatly modifies the assertion, that *they* were responsible, on the part of the Royal Society, for sending out these Germans, at a vast expense of English money, to survey rivers, hills and climates, with which we were perfectly familiar, and to collect Flora and Fauna, which, at the time they left London, were actually rotting in the vaults of the East India House. So far, good. When we expressed our own reserves, and invited General Sabine and Sir Roderick Murchison to explain their part in the transaction, we had reason to believe that the facts would turn out to have been what they now appear. But now comes the difficulty. How can we reconcile the explanations of General Sabine and Sir Roderick with the assertions of the book? In the address to Sir Charles Wood, the Messrs. De Schlagintweit declare that they were sent out to India "by the energetic assistance of Col. Sykes, on the part of the Court of Directors, and of General Sabine and Sir Roderick Murchison on the part of the Royal Society." The volume in which these words appear is dedicated—we suppose, by permission—to the Royal Society. Nay, more, we are told that through this influence "all the official arrangements were made without any delay." Are we to understand that these statements have no foundation in fact,—that they are pure inventions of the Messrs. De Schlagintweit? That is a very grave inference, and one that we should be most grieved to make. We hope the matter will be explained. As more money will be wanted for the work—in addition to the 30,000*l.* which is said to have been already wasted—the whole question will have to be brought before the House of Commons; and it would be painful to find questions about the scientific value of Messrs. De Schlagintweit's observations mixed up with other questions as to the veracity of their text. For ourselves, we have no interest in this private matter, save as reporters for the parties. It is for the Messrs. De Schlagintweit to relieve themselves, if they can, from the consequences of such express denials, and especially of those made by Sir Roderick Murchison. Our interest lies in the scientific question. We object to useless and expensive expeditions to discover what we already know. We object to the employment of German travellers to do over again the work which more competent Englishmen have already done. Goldsmith's suggested voyage of discovery, with the result of a wheelbarrow, is a light pleasantry compared with the ponderous mistake of the Messrs. De Schlagintweit's volumes, at a cost of nearly 40,000*l.* We are glad that our remarks have procured for the public some part of the secret history of this scientific job; and we take the liberty of inviting answers to two or three queries. Did the Royal Society recommend the employment of Messrs. De Schlagintweit or not? Did it accept the dedication of their volume? Did Mr. Darwin and Dr. Hooker do more than suggest how they might be usefully employed, supposing they were employed at all?

We are glad to find that the statement current in Paternoster Row last week, to the effect that Messrs. Blackie & Sons had lost the copper-plates of their 'Imperial Atlas' in the disastrous fire, is untrue. The plates are uninjured; as they were fortunately not in the Row during the fire.

The British Museum re-opened on Monday. The improvements have been considerable, and the increase of attendance on the part of the public during the week has been likewise considerable.

The Ray Society held its Annual Meeting on Friday, at Manchester, after the meeting of Section D. of the British Association, in one of the rooms of the Royal Institution, Sir Philip Egerton in the chair. The Report of the Council stated that the financial condition of the Society is now more flourishing than for many years past. The volume for 1860, Dr. Carpenter 'On Foraminifera,' is in the press. For 1861 the members will obtain Mr. Currey's translation of Dr. Hoffmeister's work 'On the Higher Cryptogamia.' The other new works in preparation are: Dr. Bowerbank 'On the British Spongiadae,'—the second volume of Mr. Blackwall's 'British Spiders,'—Dr. Günther 'On the Reptiles of British India,'—and Mr. Douglas 'On British Hemiptera Heteroptera.' Sir Philip Egerton was elected President; Mr. Lubbock, Treasurer; and Mr. Stainton, Secretary.

Mr. Brierly writes:—

"8, Liddington Place, Sept. 9, 1861.

"In the communication about 'Whales and Whaling,' which you did me the honour to insert in your number of last week, either a slip of the pen on my part, or a misprint, makes the footnote †, by a single word, convey an opposite meaning to that intended. It should have been, 'These *Balenoptera* were not the *Gibbosa*, or Hump-back, found in these seas, which is considerably smaller.' As it stands, it would appear that the *Gibbosa* is meant to be the larger of the two."

In its late editions the Almanac of Gotha has recognized Victor Emmanuel as King of Italy. It will be some consolation to the Roman power, after such a blow, to find that the new edition of Murray's 'Handbook for the Papal States' has not recognized the annexation to Piedmont of the provinces of Urbino, Pisano, Ancona, Macerata, Camerino, Fermo, Aroli, Perugia, Spoleto, Rieta, and Orvieto. Albemarle Street is slow to recognize the rights of revolution. Mr. Murray does not actually close his eyes on fact; indeed, in the matter of all such information as may be useful to the travelling Briton he shows himself, in this edition, uncommonly wide awake. But as the Great Powers have not accepted the revolt of Umbria and the Marches, he will not accept it. Time, we hope, will bring him round. England accepted this annexation when it sent an ambassador to the King of Italy. France has done the same. Sweden, Denmark, Portugal, and Brazil have followed suit. Prussia is about to do it. Perhaps, when Austria has yielded, Albemarle Street will also yield. We hope so. It would be very annoying to be stopped at the Italian frontier and questioned by the Bersagliere about the contraband politics of the Red Book. Otherwise, this new edition of a book indispensable to the tourist in Italy is brought down to the latest dates.

Mr. Shaw, of Dundee, has published a railway and road map for the use of tourists in Perthshire. The work is engraved by Messrs. Johnston,—a sufficient guarantee for its accuracy and beauty. The hills and dales, the castles and churches,—everything interesting to the rambler for health and recreation,—will be duly found in its place.

The native school of Russian Art—of which we know very little in this country—commenced very nearly at the same time as our own. Lossenko, the first Russian painter, was a contemporary with Gainsborough and Hogarth; and we hear with satisfaction that the Russian Academy of Arts has decided upon commencing the illustration of the Russian School of Painters in the International Exhibition of 1862 at the year 1764. They will begin with Lossenko.

Dr. R. Luther, at Bilk, discovered on the 13th of August the seventy-first of the Planetoides, and observed it up to the 15th. Three observatories have already recognized it as such; and several astronomers, who met at Dresden on the 20th of August, gave it the name of Niobe. The newly-discovered planet stands now in the constellation of Aquarius, and is a star of the eleventh magnitude.

The great annual distribution of prizes by the French Academy took place at Paris on the 29th of August. M. de Laprade, the present Director, opened the ceremony by an address, in which he

held forth on the different instances of superior goodness and virtuous actions which had been rewarded with the prizes of the Monthyon Fund. The first prize of virtue, 3,000 francs, was awarded to Abbé Soret, for nineteen years the minister at Luzarches (Seine and Oise), who had during this period, himself undergone the severest privations, in order to assist the poor and suffering in his parish with his meagre savings; Pierre Espagne, of Bordeaux, who saved the lives of eighteen persons shipwrecked, received the second prize. Three more prizes of 1,000 francs each, and twenty of 500 francs, were awarded to four men and nineteen women. M. Henri de Bornier received the large prize of poetry (on the Canal of Suez); M. H. Buillet a prize of 4,000 francs for the best translation into French of the 'Enneades of Plotinus.' M. Jules Lecomte received an honourable mention by the Secretary of the Academy, M. Villemin, and a medal of 2,000 francs, for his book 'La Charité à Paris.' The great prize of Baron Gobert was awarded in equal parts to the MM. Dargand and Geruzet. The distribution of a number of smaller prizes in various branches of literature and science closed the festivity.

The alterations which are being made in Goethe's house of birth at Frankfurt, which has passed into private possession, are the talk of the town. Here we have a people whose cry for unity at this moment resounds from the Baltic to the Adriatic, from the Russian to the French frontiers, who assemble in Turnvereinen, archery associations, national leagues, Singervereinen, and countless other meetings; a people who impose a tax on themselves for the creation of a German fleet, a tax so severe, that every labourer, student, &c. who indulges in a glass of ale, for which he pays a groshen, puts a penny into a box for the German fleet: no one, who has any knowledge of the quantity of ale a German throat may indulge in, will be in the least surprised to hear that the sum of money thus collected is already very considerable, and promises to become enormous if the hot weather lasts, which favours so much the consumption of the malt beverage: yet, with all these efforts, Goethe's house passes into private possession. We refrain from any comment on contradictions which prove how small the progress towards a true national feeling in Germany has yet been. We know nothing of the present possessor of Goethe's house, not even his name; he may be a sensible and intelligent man, who takes the duty upon him of preserving, in its original state, the birth-place of Germany's greatest poet; still, this is no guarantee for the future, and does not save the German nation from the blame of allowing Goethe's house to be anything else but a national sanctuary.

SCIENCE

BRITISH ASSOCIATION.

Manchester, Sept. 12.

THOSE who last week went the furthest in their predictions of our success now find themselves far behind. Our success is, in fact, magnificent and unprecedented. The success, too, is of every kind. We have had no such gathering for numbers—for local subscriptions—for solidity and practicalness in the papers read—for continued and personal interest in the themes discussed in Section—or for the excellence and rarity of the evening discourses. The Astronomer Royal's discourse on the Eclipse drew an audience to the Free Trade Hall which tested even its capacities of accommodation. Prof. Miller's lecture on the Spectrum Analysis, in the Concert Hall, was well received, though the subject is sufficiently difficult to the unsentimental mind. The Microscopical evening, the Electric Telegraph evening, and the National History evening, brought to the great Hall crowds so vast as to remind some of those present of the times of political excitement and controversy. The hospitality of the citizens has been endless. And finally, it is only fair to add, the reporting of Sectional work by the local papers has been far beyond the average in intelligence and rapidity.

The two subjects which rose in popular interest above all others have been the Origin of Man and

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Iron-plated Ships. Prof. Owen made some very important contributions to the first question. These will be found in our Sectional reports. Mr. Fairbairn rather disappointed expectation by his reserve on the subject of iron plates. His reserve was, no doubt, very wise; but the good folks who had made up their minds that on Saturday morning, in the little Swedenborg Hall, they would learn "all about it," had to put up with a smart passage of arms between Mr. Fairbairn and Sir William Armstrong, instead of revelations from the Reports of the Sheshbourness Committee. What was said will be found authentically stated in our Sectional Report.

The General Committee held its meeting yesterday (Wednesday), at the Free Trade Hall. It had been already settled that the meeting of next year is to take place in Cambridge. No chairman has been fixed on; and, of course, it is imagined by some that this post may be accepted by the Prince of Wales. Dr. Whewell, Prof. Airy, and Prof. Sedgwick are appointed Vice-Presidents. The period was left open, and will be agreed upon with the local officers. The following Recommendations, involving grants of money, were adopted:—Kew Committee, 150*l.*, Photographic Pictures of the Sun.—Col. Sykes, 200*l.*, Balloon Committee.—Prof. Williamson, 50*l.*, Standard of Electrical Resistance.—Mr. Glaisher, 20*l.*, Luminous Meteors and Meteorites.—Mr. Jenkin, 20*l.*, Thermo-Electric Currents.—Mr. Hennessy, 20*l.*, Connexion of Storms and Vertical Atmospheric Currents.—Mr. Gages, 8*l.*, Analysis of Minerals.—Dr. Hooker, 40*l.*, Report on Lancastrian Coal-fields.—Sir—Bunbury, 40*l.*, Flora of the Coal-Plants.—Mr. Scott, 25*l.*, Report on the Rocks of Donegal.—Mr. Jeffreys, 25*l.*, Dredging, coast of Durham; 25*l.*, Dredging, N.E. coast of Scotland; 15*l.*, Dredging, Dublin Bay; 5*l.*, Dredging, River Mersey; and 10*l.*, Ravages of the Teredo.—Mr. Slater, 10*l.*, Report on West Indian Vertebrata; and 50*l.*, Report on Species of Apteryx.—Mr. Wright, 10*l.*, Report on Fishes of Dublin Bay.—Mr. Slater, 10*l.*, Report of Mollusca of North America.—Dr. E. Smith, 20*l.*, Report on the Effects of Prison Discipline.—Dr. Collingwood, 5*l.*, for collecting Objects of Natural History by means of the Mercantile Marine.—Right Hon. J. Napier, 150*l.*, Committee on Patent Laws.—Prof. J. Thomson, 15*l.*, Gauging Water Pipes.—Mr. Fairbairn, 25*l.*, Accidents on Railways.—Duke of Sutherland, 150*l.*, On Steamship Performances.—Mr. Oldham, 25*l.*, Tide Observations in the Humber.—Kew Committee, 500*l.*, for the Observatory, one year; and 40*l.*, for the Photoheliometer.—Prof. Phillips, 100*l.*, an Assistant, one year.—Index to Reports, 600*l.*—Prof. Phillips stated that the Recommendations amounted to 2,363*l.*, as against 1,395*l.* last year.

In addition to these, the following Recommendations, not involving grants of money, were adopted:—Prof. Stokes, a Report on Physical Optics.—Mr. Cayley, a Report on certain Problems of Dynamics.—Mr. A. Smith and Mr. Evans, a Report on the Reports of the Liverpool Congress.—Prof. Stoney, a Report on the present state of Molecular Physics.—Dr. Lloyd, a Report on the Application of the Gaussian Theory of Magnetism to the Periodical Magnetic Variation.—Dr. Robinson, Communication with Government on the best System of Fog Signals.—Dr. Lloyd's paper on the Secular Magnetic Changes to be printed among the Reports.—Mr. Schunk's paper to be printed in the Report.—Mr. Crace Calvert, a Report on the Properties of the Woods used in Dockyards.—Prof. Williamson, Registration and Publication of the Numerical Facts of Chemistry, and on Scientific Evidence.—Mr. G. Jeffreys, a Report on the Dredging Operations.—Mr. Foster, a Report on Muscular Irritability.—Dr. Drury, Dr. Muroff's Report.—Mr. Hunt's paper to be printed *in extenso*.—Mr. Heywood, Application to Charity Commissioners.—Admiral Sir E. Belcher, a Report on Steam Navigation in the Port of London.—Mr. Fairbairn, a Report on the Experiments made at the Manchester Waterworks.—Mr. Atherton's paper on Steam Performance to be printed among the Reports.—Mr. Reid's paper on the Iron-Cased Ships to be printed *in extenso*.—Mr. Webster, to

communicate with the Parliamentary Committee regarding a Reform of the Patent Laws.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

President—G. R. AIRY.
Vice-Presidents—J. P. JOULE, Rev. Prof. PRICE, Prof. ADAMS, The LORD WROTTELEY, GEN. SABINE, Sir DAVID BREWSTER, Rev. T. P. KIRKMAN.
Secretaries—Prof. J. STEVELL, Prof. H. J. S. SMITH, Prof. R. B. CLIFTON.
Committees—Prof. Andrews, J. Baxendell, Admiral Belcher, J. Bonomi, C. Brooke, A. Cayley, Rev. Prof. Temple Chevalier, Warren De La Rue, J. P. Gossio, J. H. Gladstone, J. Glaisher, G. Griffith, Prof. Bienen de Haan, Sir W. B. Hamilton, Rev. E. Hincks, W. Hopkins, Prof. Hennessy, F. Jenkin, M. Kupffer, J. Lee, H. Lloyd, E. J. Lowe, E. Muroff, Dr. Matthiessen, H. Patterson, Prof. Phillips, Gen. Portlock, Rev. T. R. Robinson, Prof. Rogers, J. Scott Russell, A. Sandeman, C. W. Siemens, A. Smith, Dr. J. A. de Souza, B. Stewart, G. J. Stoney, W. Spottiswoode, Col. Sykes, Prof. J. J. Sylvester, Prof. Tyndal, T. Webster, Prof. Wheatstone, R. Worthington.

THURSDAY.

On taking the Chair the PRESIDENT briefly stated the objects of the Sectional meetings and the mode of conducting their proceedings. The Section over which he had been placed as President embraced the subjects of Pure Mathematics and Natural Philosophy in every one of their branches which were not purely technical, these being committed to the care of other Sections; the entire ranges of measures and numbers in their abstract relations and applications, so as to prepare the mind for the using of its powers and improving it in its acquisition and dissemination of knowledge. Astronomy, the branch with which he was more immediately connected, had been the first to experience the fostering care of the British Association, and between that and the grants obtained from Government through its influence the two important works had been given to the scientific: 'The British Association Catalogue of Stars,' and 'The Greenwich Observations,' which, but for this aid, must have remained a useless mine of buried astronomical treasure. He then briefly sketched the importance to the science of magnetism of the Government Magnetical Expeditions, and the fixed magnetical observatories which had originated or been established at their solicitation or suggestion, and he pointed out the importance of these both in establishing the sure foundations of the science, and in putting us in possession of facts not before even suspected to have an existence. He next proceeded to describe the manner in which the business of the Section was conducted. He explained that after papers were read conversation upon each, so far as time permitted, was not only allowed but courted, and here perfect liberty was allowed to each to dissent from the opinions of others, and each was to receive in perfect good humour the unsparing slaughter of any of his opinions, however dear they might be in his own estimation. And here he wished to give two or three cautions, which would be found most useful: first, that science, pure science, was alone their object, and that more serious subjects were entirely forbidden. Secondly, that each should, to avoid the slightest appearance of personality, address the meeting through the Chair. Thirdly, that he must in that chair be a perfect despot; that his dictum must, for the time, be law; and, for an instance, they must not feel displeased if he peremptorily rejected all discussions about perpetual motion, the trisection of an angle, or any subject which would lead to the subversion of any of the well-established foundations of any of the exact sciences. One suggestion he would venture to throw out to those who had communications to make on the more transcendental branches of science, viz., to hold over for a more suitable occasion any subject which could not be made quite intelligible by an oral exposition. He exemplified this by reading the title of one of the papers proposed to be read to the Section, adding that he had no doubt that the meaning of this was clearly understood by the author himself, but, for his part, he (the Astronomer Royal) had not a conception of its meaning. He need scarcely add, that he hoped authors, in avoiding this error, would not fall into the opposite, of beginning at the very first principles of the science connected with their subject. He concluded by informing the Section that a letter had been received from Prof. G. G. Stokes, stating that circumstances had prevented his completing the Report on Physical Optics which he had been requested by the British Association assembled at

Oxford to draw up, but that if the Association honoured him by a renewal of the request he hoped to have the Report ready for presentation at its next year's assembly. The Astronomer Royal stated that the Committee of the Section had that morning sent forward a request to the Committee of Recommendations that the above-mentioned request to Prof. Stokes be renewed. He further stated that Mr. Cayley had at the same meeting been requested to draw up a Report on the Solution of certain Special Problems of Dynamics, that he also was not yet fully prepared to present this Report, and a similar request in this case had also been sent forward to the Committee of Recommendations.

'Report on the Progress of Celestial Photography since the Meeting at Aberdeen,' by WARREN DE LA RUE.

Dr. ROBINSON pointed out the advantages to science likely to result from these researches of Mr. De La Rue; concluding by saying, that it would be shameful to allow the entire expense of the very costly apparatus required for producing the adjustments indispensable in these researches to fall on one individual; adding, that he had no doubt that, if the Committee of the Section would send forward to the Committee of Recommendations a request that a suitable sum of money be placed at Mr. De La Rue's disposal for the continuance of those researches, that that request would be cheerfully complied with, and that Mr. De La Rue would still afford what money could not purchase—his own invaluable superintendence and co-operation.—The ASTRONOMER ROYAL, after heartily concurring in the suggestion of Dr. Robinson, called the attention of the Section to the large photograph of the sun, and especially to the rapid shading off of the intensity of the light towards the outside of the sun's disc. He and the late M. Arago had differed on this very point.—M. Arago maintaining that the intensity of the sun's light must increase towards the edge of the disc, while he, the Astronomer Royal, ventured to maintain the contrary opinion. Here, by this very ingenious process by which Mr. De La Rue had succeeded in photographing the sun's disc, it became palpable that his opinion was in accordance with the fact in nature; while that of M. Arago cannot any longer be maintained. The photographed fact settles the question.

'On the Distribution of Fog round the British Isles,' by Dr. J. H. GLADSTONE.—The Royal Commissioners on Lights, Buoys and Beacons, whose Report was laid before Parliament last session, asked, among other things, for the number of days in 1858 on which fog had been noted in the Meteorological Register at each lighthouse and floating light round the coasts of the United Kingdom. From the published returns the author had drawn up a list, showing the frequency of fog at 200 different sites. On a comparison of these, the following conclusions appear to be warranted:—1st. That fogs are more numerous around England and Wales than around Scotland; while Ireland is still less frequently visited by them. The average number of days for the whole of the British Isles is—on shore, 24; at sea, 20. 2nd. That the distribution of fog on different parts of a sea varies little, even though it varies greatly on different parts of the adjoining coast. 3rd. That the frequency of fogs on the coast is in many places far less than on the neighbouring sea; but that all such stations are low ones:—for instance, the sandbanks at the mouth of the Thames and the breakwaters. 4th. That two stations, very near one another, but differing in their elevation above the sea, often differ widely in the frequency of fog, the low station being generally the less foggy. 5th. That when the land rises to a considerable height, and is so situated that it meets the south-westerly winds directly after they have traversed the ocean, a frequent deposition of fog or cloud results. This is especially evident on the south and south-west coasts of England and Wales, and on certain prominent points on the west or north of Scotland. The highest number is at Barrow Head, the southernmost point of the Hebrides, viz., 126; and this is the highest light-

house station in the United Kingdom, and near to the Gulf Stream. The smallest number, 4, is at Troon, in Ayrshire. 6th. That where a large area of sea is surrounded on most sides by land, fogs are comparatively unfrequent.

This communication gave rise to an animated discussion; the general opinion being that it was not sufficiently settled what should be called a fog.—Mr. GLAISHER stating that, so far as the returns made to him of the days on which fogs prevailed, the numbers stated by Dr. Gladstone as the averages of the year would more accurately express the averages for the months of September and October.—The ASTRONOMER ROYAL wound up the discussion, agreeing with Prof. HENNESSY, that an exact definition of the term "fog," by the distance to which vision was obscured, should be adopted, and that in registering fog any day on which it was necessary to ring the fog-bell might safely be returned as one on which a fog prevailed.

'On an Electric-Resistance Thermometer with Balancing Coil,' by C. W. SIEMENS.

'On a Panoramic Lens,' by T. SUTTON.—This lens consisted essentially of a hollow sphere of crystal glass, inclosing water, with a central diaphragm and orifice, so managed as to give equal illumination to the centre and extremities of the panoramic picture, which was received on a screen concentric with the lens. Several photographic pictures taken by it were exhibited, and were entirely free from distortion of figure; what should be straight lines being accurately straight in the pictures, which were stated to extend to an angle of 120°.

Mr. C. BROOKE exhibited and explained the construction of the lens, which, he asserted, was rendered perfectly achromatic by a proper adjustment of the surfaces of the glass envelope and the central receptacle for the water. He also exhibited and explained the entire apparatus used with the lens in obtaining the photographic pictures or panoramic views of particular localities.—Prof. CHEVALIER considered that, when the picture which was received on a concentric screen was spread out into a flat picture, the perspective could not be preserved.—Mr. BROOKE admitted that, mathematically speaking, there was some distortion of the perspective, but it was so trivial as not at all to interfere with the general effect of the panoramic picture.—The ASTRONOMER ROYAL considered that the obtaining of panoramic photographs of scenes so accurate as those exhibited to the Section, and extending 120° round the observer, was a most important advance in the practical development of photography.

'Cases of Planetary Instability indicate the Appearance of Temporary Stars,' by D. VAUGHAN.—This was an entirely speculative essay on the manner in which the approach of revolving planetary bodies to the central in a course of ages, and their breaking up into fragmentary portions, would account for temporary stars, meteors, and other phenomena.

The ASTRONOMER ROYAL would not attempt to decide on the possibility or impossibility of events occurring in a course of ages in accordance with those dwelt on by the essayist. Under ordinary circumstances, the preservation of the plane in which a planetary body moved, and the permanency of the eccentricity, were established facts; but some of the phenomena of the satellites and rings of Saturn showed that it would be hazardous to decide off-hand a subject so very speculative as that discussed in this essay.

'Observations on the Structure of Copper, as seen with a Microscope,' by W. VIVIAN.—The author on looking at some broken pieces of pure copper was at first inclined to consider the structure of the fracture as crystalline; but, on examining it with a microscope, he found this a mere appearance: the true structure being a multitude of minute cells communicating with each other, but separated by compressed diaphragms. He found a somewhat similar, but characteristically different, structure in the fracture of iron and other metals.

Mr. TOMLINSON, of King's College, London, read a paper 'On Lightning Figures,' chiefly with reference to those tree-like or ramified figures sometimes found on the bodies of men and animals that

have been struck by lightning. Professor Poeey has collected a number of such cases into a memoir, entitled 'The Photographic Effects of Lightning,'—a second edition of which has been published at Paris during the present year. One of these cases is the following:—A boy climbed a tree to steal a bird's-nest; the tree was struck by lightning, and the boy thrown to the ground; on his breast the image of the tree, with the bird and nest on one of its branches appeared very plainly. Mr. Tomlinson explains such cases by referring to breath-figures, and showed that when the discharge of a Leyden jar is received on a pane of glass, it burns away a portion of the organic film which covers all matter exposed to the air, so that when breathed upon, the moisture condenses in unbroken streams along the lines where the electricity has passed; while on the other parts of the surface the moisture condenses in minute globules, so that on holding the glass up to the light the figure is distinctly seen, so long as the breath remains on the plate. This figure resembles a tree, bare of leaves, and might (as the President of the Section afterwards remarked with reference to the diagrams exhibited) be taken for any tree in the world. In this figure we have a broad and somewhat rippled line of least resistance or path of the principal discharge, branching off from which are numerous ramifications, from each of which proceed large twigs, and from these smaller ones of great delicacy and beauty. It can be proved that when the discharge of a Leyden jar is thus received on glass, the jar sends out feelers in all directions to prepare the way for the line of least resistance, and this being accurately marked out, the principal discharge takes place. In some cases the discharge bifurcates, and even trifurcates. If the glass presents too much resistance, the breath-figure consists of three feelers only, and these are the lines which produce the sensation of cobwebs being drawn over the face, which seamen sometimes describe as the forerunners of the ship being struck. The main trunk is hollow, and resembles in its structure the silicious tubes known as fulgurites. Mr. Tomlinson took this figure to be typical of the lightning discharge which strikes terrestrial objects, and objected to the stereotyped zigzag by which a stroke of lightning is generally represented. His theory is, that when a tree-like impression is found on the body of a man or animal struck by lightning, a portion of the fiery hand of the lightning itself has passed over the victim and left its mark. Several cases of this kind were described and discussed, but allowance must be made for the imagination of by-standers, which leads them to see in these ramified impressions "an exact portrait of the tree"; the blotches are taken for leaves, for a bird or bird's-nest, &c., as the case may be. Cases were also examined in which these tree-like impressions were referred by medical men to ecchymosis; other cases, in which the impressions of a horse-shoe, of a nail, of a metal comb, of coins, &c., were found on the persons of the victims, were explained on the principle of the transfer of metallic particles from one conductor to another, as illustrated by the well-known experiment of M. Fusi-nieri. Mr. Tomlinson rejected the photo-electric theory, by which M. Poeey attempted to account for the production of all these figures; and in the discussion which afterwards took place, the ASTRONOMER ROYAL, Professor HENNESSY, and others, were disposed to agree to Mr. Tomlinson's view of the subject.

FRIDAY.

Mr. GLAISHER read the 'Report of the Committee upon Luminous Meteors.'—He commenced by regretting that so few observations had been made by Members of the British Association, and expressed a hope of better organization for the future. During the nights of both the August and November epochs in the year 1860, the sky was generally overcast, and but few meteors were seen. On the other hand, in the August just passed many meteors were observed; but of all seen in the year, accounts from three different observers of the same meteor in one case, and from two in another, had only been received by any member of the Committee, and of all the rest one account alone; so that no additional information could be added to the obser-

vations themselves. Some additional account during the year had been received of meteors which had been previously noted, and of one so long back as the 11th of June, 1845, which was seen near Adalia, in Asia Minor, by the Rev. F. Howlett. He describes the day as very sultry, the sky cloudless, when suddenly a meteor, which resembled a bright but permanent flash of lightning, appeared in the north, near to the pole-star. All present became absorbed by the magnificence of the spectacle, and after a time heard a dull, heavy report. The interval of time was estimated to have been from seven to eight minutes between seeing a light of the explosion and hearing the report, indicating the distance of ninety miles from the observer. A third account of the same meteor, has been received from Mount Lebanon, thus giving an additional account of this remarkable phenomenon.—Extracts were then given of the various papers and communications which have been made during the past year by Prof. Haidinger to the Imperial Academy of Vienna relative to the meteorite of the 26th of May 1751, which is remarkable as being the first, and for a long time the only one, of metallic iron. Prof. Haidinger first produced a later document, and an original German translation, and a third account, found recently in a Library at Agram. Two pieces of iron fell, one of 71 lb. in weight, and which is still in the Imperial Cabinet of Vienna. From observations the meteor passed from 48° N. to 40° 6' N., and from 20° 18' to 34° E., or from W. to E. No observations were made of its velocity; but its height, before its fall at Haidach, was from forty-three to fifty-two miles. It was stated that the report of this meteor was heard over an area of nearly 1,000 square miles. This iron was the first in which (accidentally, as it happened) was discovered the peculiar crystalline markings now known as Widmannstathian figures, and are generally found to be of meteoric iron, and best seen when the iron is polished, and then etched with acid. Mr. Haidinger further, in a paper read on the 19th of April, 1860, spoke of a typical form of meteor, as exemplified in the stone which fell at Stannern, in Moravia, on the 22nd of May 1808, which, on the foremost part, appeared rounded the crust showing streaks, parallel to the probable line of direction through the air, and puckered up, like kneaded dough, behind. He then observed that there must be a starting-point from some fundamental considerations of the phenomena themselves, in an understanding of their form.

There are, first, the stone leavi-
restrial space as a solid; secondly, its velocity being greater on entering the earth's atmosphere, thirdly, it is retarded by the resistance of the air; fourthly, the fireball is formed by the compression of the air behind it, and the rotation of the stone resulting therefrom; fifthly, the termination of the first part of the path is marked by a detention from the so-called "explosion," caused by the collapse of the vacuum from the air rushing in with great violence. Several points of interest, bearing on the question of meteors, have been recently noticed by Mr. Greg in his remarks on the tabulated results given at the end of a large 'Catalogue of Fire-balls and Aërolites,' published in the Oxford volume of the British Association Reports for 1860, and may here be alluded to. First, there appear to be indications of an eight-yearly maximum and minimum period for aërolitic meteors, the calculated years of maxima being 1859, 1851, 1843, 1835, &c., and very nearly agreeing with observed years. Secondly, there appear to be aërolitic and meteor epochs both distinct from and common to each other. Thirdly, while the aërolitic class of meteors in its total is rather under the average for August, which is the principal and most constant month for an abundance of sporadic meteors, it is over the average for November, likewise a month noted, though not so regularly, for an abundant display of meteors. Fourthly, there is a most decided tendency in meteors of the aërolitic class (i.e. those accompanied by detonation or the fall of stony fragments) to fall in the afternoon rather than at any other time; the numbers being, out of 130 observations, from 6 A.M. to noon, 42; and from

moon to 6 P.M. 88, i.e. more than double. Fifthly, as regards the observed direction of aërolitic and first-class meteors, there would seem not to be any very great tendency one way or the other; it might have been more natural to have expected a much more decided leaning to a westerly direction. The sudden change from an easterly direction, in September and October (about the time of the autumnal equinox), to a westerly direction in November, is remarkable. In January the prevailing direction was S.E.; in February, E.N.E.; in March, N.W.; in April, W.; in May, N.W.; in June, N.W.; in July, N.W.; in August, W.; in September, E.N.E.; in October, E.S.E.; in November, W.N.W.; and in December, S. Sixthly, there have been far more falls of meteoric stones in the months of June and July than in December and January. Seventhly, taking the whole year, there is a greater tendency to equality of distribution in the aërolitic class of meteors than the smaller shooting stars and sporadic meteors; and it is highly probable that there is a distinction to be allowed between these two classes as regards orbit and physical characters. The meteors for December appear of late to be on the increase. Several days or periods in the year appear to have been rich in aërolitic and first-class meteors. Some of these are,—January 2nd and 10th; February 6th and 18th; March 1st and 7th; April 19th; June 1st and 2nd; July 17th and 29th; August 3rd, 7th and 12th; September 10th; October 1st, 3rd and 23rd; November 9th—13th; also November 29th; December 8th—13th. With regard to the November period for shooting stars, E. C. Herrick, of the United States, considers it to be advancing into the year at the rate of three or four days a century, the period of *maximum* being about thirty-three years; Mr. Greg, however, considers it may be nearer seventy. If Herrick is correct, then the November period should again culminate in 1866. In conclusion, the Committee begged to impress upon the Members of the British Association the necessity of more complete and numerous observations, noting the times of their appearance and disappearance; using a watch regulated to railway time, or whose error from railway time is nearly known; noting the size, colour, direction and general description of the meteor, its place among the stars at its first and at its last appearance; its altitude. The larger and more brilliant meteor, the more desirable it is to receive from a number of distant observers.

To explain the Earlier Physical Meteorites, as well as some of the pending their fall on our Planet,' by

VON HALDINGER.

Observations on the Preceding Communication,

R. P. GREG.

'On the Deposit of the Metal which takes place from the Negative Terminal of an Induction Coil during the Electrical Discharge in Vacuo,' by J. P. GASSIOT.—When the electric discharges by an induction coil are made from platinum wires hermetically sealed in a vacuum tube, as usually constructed, the wire which is attached to the negative terminal of the coil shortly assumes the appearance of being corroded: this arises from very minute particles of the metal having been disintegrated and separated from the wire, which particles are deposited on the sides of the tube in a lateral direction. If the wires are protected within the vacuum by being covered with glass tubing open at the end, but extending about one-eighth of an inch beyond the wire, it is the inside of this tubing that becomes coated with metal; but exclusive of this lateral action, a portion of the negative discharge will be observed to obtrude from the glass tubing in the form of a luminous brush; this luminosity is very sensibly affected by a magnet, and can in this manner be made to impinge on different parts of the vacuum tube, and wherever it is thus impinged heat is always evolved. The above phenomenon of the deflection of the negative discharge was described in a paper communicated by me to the Royal Society, and as I was subsequently desirous to examine with greater accuracy the nature of the deposit thus obtained from the negative terminal, and particularly if it could be obtained in the same manner from other metals than platinum, I had

an apparatus constructed in which the discharge could be directed on slips of glass; the apparatus was also so constructed that wires of different metals could be inserted, and in this manner I succeeded in obtaining deposits of the following metals:—gold, silver, copper, platinum, zinc, iron, tin, lead, (brass), magnesium, tellurium, bismuth, cadmium, and antimony—for many of these I was indebted to Mr. Matherson, who furnished them to me in a pure state. With gold, silver, platinum, tin, and bismuth, the deposit would take place in the state as now exhibited in about twenty-four hours' action; if the discharges were continued the deposit became denser, and, as will be observed, in one or two instances the centre is crystalline. With reflected light a large surface exhibits the lustre of the metal—with transmitted light the outer portion is transparent, showing the peculiar colour of the metals, as gold, green; silver, bluish-purple; platinum and tin, blackish-grey; tellurium, with the exception of antimony, I found disintegrated more freely than the other metals; while iron and magnesium were the most difficult; the deposit of the latter is scarcely perceptible. With aluminium wires I could not obtain any deposit after forty-eight hours' constant action; on one occasion I observed a faint trace on the glass, but in repeating the experiment with another wire no sign of any deposit could be obtained. Under the microscope the thin layer or deposit of metal is not resolved into any form, but appears as a mere film on the surface of the glass. From a brass wire terminal there was not any separation of the original metals. I had a tube constructed with two wires, both protected by glass tubing; a long slip of glass was inserted, so that the discharges from the + and the - terminals of the coil could be made with protected wires under the same conditions. The wires were of gold. The usual deposit took place at the negative; but after twenty-four hours' constant action not the slightest indication of any deposit from the + wire could be observed. With antimony a very peculiar effect was obtained; instead of the metal being deposited in a circular form, it spread nearly all over the glass and on the sides of the vacuum tube. I repeated the experiment by inserting slips of glass of sufficient length to reach beyond the terminals. Two of these glasses are on the table, and, if examined, it will be seen that the + discharge has apparently repelled the deposit as it formed from the negative wire, leaving a space somewhat analogous to the dark band which appears in the luminous stratified discharge. Whatever may be the cause of the difference in the action of the electrical discharge between the positive + and the negative -, the disruption of the particles of metal in the latter is merely mechanical; the minute particles are disrupted by the force of the discharge, which at the negative meets with resistance, and which resistance under certain conditions is attended with considerable heating effects, as if the wires are thin the negative invariably fuses, whether the discharges are made in air or in vacuo.

'On the Apparent Path of a Projectile, as affected by the Rotation of the Earth,' by the Rev. Prof. PRICE.—This communication, though in its details eminently mathematical, yet conducted to conclusions, some of which had an important bearing on the directing of missiles discharged from some of those new guns which in some cases gave them destructive powers even at ranges of 10,000 yards, or nearly six miles. The author, after explaining to the mathematical part of his audience the symbols which he used and the successive integrations by which he arrived at the more general results, and the approximations by which these became so simplified as to be applicable to practical uses, these approximations chiefly depending on the very small fraction which expresses the angular velocity of the earth per second—a fraction which, when expressed decimally, has four ciphers after the decimal point before the first significant figure is arrived at, and whose square, therefore, and higher powers are too small to be of any practical value. He thus arrived at simple linear equations, which were easily integrated, and thus the path of the projectile obtained with sufficient exactness for all practical purposes. He selected

two useful examples,—one where the initial velocity was nothing, as in the case long ago investigated by Hook, of a stone dropped from the hand into a deep mine, or from the top of a high tower, the path turning out to be a cubical parabola, showed a deviation to the east with a very small deviation to the south, from the point immediately beneath that from which it had been let drop, as actual experiment had determined it to be long since. The other example selected was that of a gun, directed due north or due south; in either case a westerly deviation being indicated, so that a gun of long range being directed exactly to its object the ball would never strike that object. He also stated, that at every rhomb along which the gun was directed a deviation peculiar to that point of the compass was indicated by the formula.

'On the Canonical Form of the Decadic Binary Quantic,' by W. SPOTTISWOODE.

'On Petzval's Asymptotic Method of solving Differential Equations,' by W. SPOTTISWOODE.—These papers were so purely mathematical that they could not be made interesting to our general readers. Indeed, the President induced the author merely to announce to the Section the title of the first communication, which entitles it to a place in the report of the *Proceedings of the Meeting*, where it can be studied at leisure.

'Observations on the Production of Colour by the Prism; the Passive Mental Effect, or Instinct in comprehending the Enlargement of the Visual Angle, and other Optical Problems,' by J. A. DAVIES.

'The Chromascope, and what it reveals,' and 'The Prism and Chromascope,' both by J. SMITH, were further observations and speculations on the power of producing the sensation of colour by the revolving rapidity of white cards, variously cut out on a black ground—say a piece of black velvet—in strong sunlight, first exhibited to the Section at the Aberdeen Meeting of the Association. The author brought forward further evidence in favour of his optical theory, as opposed to the Newtonian, and combated the opinion that the effect of his Chromascope arose from the power of the retina to recover its sensibility to the impressions of differently coloured lights at successive times.

'An Experiment; being an Attempt to illustrate the Roseate Phenomena seen during a Total Eclipse of the Sun,' by J. SMITH.—The author considered that he had succeeded in producing the effect of the flame-coloured light seen during a total eclipse by causing a blackened circle to revolve rapidly in front of a strongly illuminated white circular card representing the sun. But as the author was not present to explain, nor the instrument to perform the experiment, no opinion could be formed as to what the experiment proved, or whether or not it illustrated the phenomena in question.

Mr. HOPKINS wishing to defer his communication 'On the Motion of Glaciers,' until Monday, the business of the Section was concluded for the day.

SECTION B.—CHEMICAL SCIENCE.

President.—Prof. W. A. MILLER.
Vice-Presidents.—Prof. ANDERSON, Prof. ANDREWS, J. P. GASSIOT, J. H. GLADSTONE, W. E. GROVE, Dr. SCHUBERT, Dr. STEPHENS, Prof. A. W. WILLIAMSON.
Secretaries.—G. D. LIVING, A. VERNON HARCOURT.
Committee.—G. Bischof, W. Blyth, Grace Calvert, Dr. T. Clark, Dr. J. Davy, Prof. Daubeny, H. Deane, W. De La Rue, Prof. Delfs, B. Edwards, Dr. Eisenlohr, G. C. Foster, Dr. Francis, Dr. Gilbert, G. Gladstone, J. J. Griffin, F. C. Griffiths, G. H. B. Hambley, Rev. W. Vernon Harcourt, J. Higgins, J. P. Joule, Prof. Kekulé, J. Lee, S. Macadam, Dr. Matthiessen, J. Mercer, H. Müller, A. B. Northcote, H. D. Poehlin, J. J. Pyne, Prof. H. E. Roscoe, R. Rumney, Dr. Russell, J. Sidebottom, R. A. Smith, Dr. Smith, D. Stone, J. Tennant, C. Tomlinson, Prof. Voelcker, W. S. Ward, R. Warington, H. H. Watson.

THURSDAY.

Opening Address by the PRESIDENT.
Report on the Manufactures of the South Lancashire District.

'On the Effect of Great Pressures combined with Cold on the Six Non-condensable Gases,' by Dr. ANDREWS.—In this communication the author gave an account of some results already obtained in a research with which he is still occupied on the changes of physical state which occur when the non-condensable gases are exposed to the combined action of great pressures and low temperatures.

The gases when compressed were always obtained in the capillary end of thick glass tubes, so that any change they might undergo could be observed. In his earlier experiments the author employed the elastic force of the gases evolved in the electrolysis of water as the compressing agent, and in this way he actually succeeded in reducing oxygen gas to 1-300th of its volume at the ordinary pressure of the atmosphere. He afterwards succeeded in effecting the same object by mechanical means, and exhibited to the Section an apparatus by means of which he had been able to apply pressures, which were only limited by the capability of the capillary glass tubes to resist them; and while thus compressed the gases were exposed to the cold attained by the carbonic acid and ether bath. Atmospheric air was compressed by pressure alone to $\frac{1}{10}$ of its original volume and by the united action of pressure and a cold of -106° F. to 1-675th; in which state its density was little inferior to that of water. Oxygen gas was reduced by pressure to 1-324th of its volume, and by pressure and cold to 1-554th; hydrogen by the united action of cold and pressure to 1-500th; carbonic oxide by pressure to 1-278th, by pressure and cold to 1-278th; nitric oxide, by pressure to 1-310th, by pressure and a cold of -160° F. to 1-680th. None of the gases exhibited any appearance of liquefaction even in these high states of condensation. The amount of contraction was nearly proportional to the force employed, till the gases were reduced to from about 1-300th to 1-350th of their volume; but, beyond that point, they underwent little further diminution of volume from increase of pressure. Hydrogen and carbonic oxide appear to resist the action of pressure better than oxygen or nitric oxide.

'On the Thermal Effects of Elastic Fluids,' by Dr. JOULE and Prof. W. THOMSON.

FRIDAY.

The PRESIDENT exhibited some Photographs of different Spectra, and read a paper on the subject. —The apparatus by which the spectra may be photographed consists of an ordinary camera obscura attached to the end of a long wooden tube, which opens into a cylindrical box, within which is a prism glass, or a hollow prism filled with bisulphide of carbon. If the prism be so adjusted as to throw the solar rays, reflected from a heliostat, upon the screen of the camera, and the wires which transmit the sparks from a Ruhmköffer coil are placed in front of the uncovered portion of the slit, the two spectra are simultaneously impressed. The solar beam is easily intercepted at the proper time by means of a small screen, and the electric spectrum is allowed to continue its action for two or three, or six minutes, as may be necessary. He did not find that anything was gained in distinctness by interposing a lens of short focus between the slit and the wire which supplied the sparks, with the view of rendering the rays of the electric light parallel like those of the sun, owing to the absorbent action of the glass weakening the photographic effect; and the flickering motion of the sparks being magnified by the lens, rendered the lines less distinct than when the lens was not used. Although with each of the metals (including platinum, gold, silver, copper, zinc, aluminium, magnesium, iron), when the spark was taken in air, he obtained decided photographs, it appeared that in each case the impressed spectrum was very nearly the same, proving that few of the lines produced were those which were characteristic of the metal. The peculiar lines of the metal seemed chiefly to be confined to the visible portion of the spectrum, and these had little or no photographic power. This was singularly exemplified by repeating the experiment upon the same metal in air, and in a continuous current of pure hydrogen. Iron, for example, gave, in hydrogen, a spectrum in which a bright orange and a strong green band were visible, besides a few faint lines in the blue part of the spectrum. Although the light produced by the action of the coil was allowed to fall for ten minutes upon a sensitive collodion surface, scarcely a trace of any action was procured; whilst, in five minutes, in the air, a powerful impression of numerous bands was obtained. It was remarked by Mr. Talbot that,

in the spectra of coloured flames, the nature of the acid did not influence the position of the bright lines of the spectrum, which he found was dependent upon the metal employed, and this remark had been confirmed by all subsequent observers. But the case was very different in the absorptive bands produced by the vapours of coloured bodies,—there the nature of both constituents of the compound was essentially connected with the production of absorptive bands. Chlorine, combined with hydrogen, gave no bands by absorption in any moderate thickness. Chlorous acid and peroxide of chlorine both produced the same set of bands, while hypochlorous acid, although a strongly coloured vapour and containing the same elements, oxygen and chlorine, produced no absorptive bands. Again, the brownish red vapour of perchloride of iron produced no absorptive bands; but when converted into vapour in a flame this gave out bands independent of the form in which it occurred combined. These anomalies appeared to admit of an easy explanation on the supposition that, in any case, the compound is decomposed in flame, either simply by the high temperature, just as water is, as shown by Grove, or, in all other cases of the production of bright lines by the introduction of a metallic salt into a flame of burning bodies (as shown by Deville). In the voltaic pile the decomposition must of necessity take place by electric action. The compound gases, protoxide and binoxide of nitrogen, gave, when electrified, the same series of bright bands (as Plücker had shown) which their constituents when combined furnish. Aqueous vapour always gives the bright lines due to hydrogen and hydrochloric acid, the mixed system of lines, which could be produced by hydrogen and chlorine. The reducing influence of the hydrogen and other combustible constituents of the burning body would decompose the salt, liberating the metal, which would immediately become oxidized or carried off in the ascending current. There was obviously a marked difference between the effect of intense ignition upon most of the metallic and the non-metallic bodies. The observations of Plücker upon the spectra of iodine, bromine and chlorine show that they give, when ignited, a very different series of bands to those which they furnished by absorption, as Dr. Gladstone had already pointed out; but it was interesting to remark that, in the case of hydrogen, which, chemically, was so similar to metal, we have a comparatively simple spectrum, in which the three principal bright lines correspond to Fraunhofer's dark lines, C, F, and G. It was, however, to be specially noted that the hydrogen occasioned no perceptible absorptive bands at ordinary temperatures in such thickness as we could command in our experiments, and the vapour of boiling mercury was also destitute of any absorptive action, although when ignited by the electric spark it gave a characteristic and brilliant series of dark bands. The following experiment suggested itself as a direct test of Kirchhoff's theory. Two gas-burners, into which were introduced chloride of sodium on the wick of the spirit lamp, were placed so as to illuminate equally the opposite sides of a sheet of paper partially greased. The rays of the electric light screened from the photometric surface, suitably protected, were made to traverse one of the flames. If the yellow rays of the light were absorbed by the sodium flame, the light emitted laterally by the flame should be sensibly increased. The experiment, however, failed to indicate any such increase in the brilliancy of the flame, possibly because the eye was not sufficiently sensitive to detect the slight difference which was to be expected.

'On the Emission and Absorption of Rays of Light by certain Gases,' by Dr. J. H. GLADSTONE.

'On an Aluminous Mineral from the Upper Chalk near Brighton,' by Dr. J. H. and Mr. G. GLADSTONE.

'On the Chemical Composition of some Woods employed in the Navy,' by Dr. CRACE CALVERT.

'On the Chemical Composition of Steel,' by Dr. CRACE CALVERT.

'On the Solvent Powers of Weak and Strong Solutions of Alkaline Carbonates on Uric Acid Calculi,' by Dr. W. ROBERTS.

'On certain Difficulties in the way of separating Gold from Quartz,' by Dr. SMITH (of Sydney).

SATURDAY.

'On Atmospheric Ozone,' by Dr. MOFFAT.

'On Sulphuretted Hydrogen as a Product of Putrefaction,' by Dr. MOFFAT.

'On the Composition and Valuation of Superphosphates,' by Prof. GALLOWAY.

'On Morin, and the Non-existence of Morotannic Acid,' by Prof. DUFFES.

'On the Constitution of Paranaphthalene or Anthracene, and some of its Decomposition Products,' by Prof. ANDERSON.

'On Piperic and Hydro-piperic Acids,' by G. C. FOSTER.

SECTION C.—GEOLOGY.

President.—Sir R. I. MURCHISON.

Vice-Presidents.—E. W. BINNEY, Sir P. de M. G. ROBERTSON, EARL OF ESSEX, J. B. JONES, GEN. FORTLOCK, Rev. Prof. SEWICK.

Secretaries.—Prof. HARKNESS, E. HULL, T. REPERT JONES, G. W. OMEROD.

Committee.—J. Atkinson, Rev. Dr. Anderson, W. T. Aveline, J. P. Bateman, A. Bryson, J. Dickenson, R. P. Greg, F. Henson, Dr. Hector, M. P. Merrian, Prof. Morris, Prof. Phillips, Prof. Tennant, Prof. Williamson, W. Pengelly, J. G. Marshall, Prof. Owen, H. Green, W. H. Baily, R. D. Darbishire, M. Escher von der Linth, J. Heywood, J. Lubbock, C. MacLaren, C. Moore, H. M. Ormerod, J. W. Saker, W. Tite, Capt. Woodall, D. Milne Home, Rev. T. Whitaker, G. D. Gibb, J. Yates, R. H. Scott, J. F. Collingwood, Rev. R. Pinder Hill, J. Gwyn Jeffreys, Rev. W. Lister, S. J. Mackie, T. A. Readwin, C. Ross, H. Seely, J. Smith, Rev. W. S. Symonds, W. Whitaker, E. Wood, A. E. Wynne, R. W. Mylne.

THURSDAY.

Opening Address of the President, Sir R. I. MURCHISON.

'Sketch of the Geology of Manchester,' by E. W. BINNEY.

'On the Recent Encroachments of the Sea on the Shores of Torbay,' by W. PENGELLY.—Hard Devonian limestones, fissile and round jointed, formed, he said, the two projecting horns of Torbay. Sandstones and conglomerates form the hollow of the bay, and have been much worn away within the memory of man, especially at Livermead, which is only preserved by continual engineering labour. The process of erosion by the sea was explained by the author as something like a succession of honeycombing, sometimes by insulation of portions of the cliffs. On the slates and limestones the sea more slowly produced excavations and ledges, which storms enlarge. The effects of the severe storm of October, 1859, on the cliffs, beach, roads, &c., of Torbay were described in detail, and the importance of such storms as modern agents of change was dwelt upon.

'On the Excess of Water in the Region of the Earth about New Zealand: its Causes and Effects,' by J. YATES.

'Notes on two Ichthyosauri to be exhibited to the Meeting,' by C. MOORE.

'On the Relation of the Eskdale Granite at Black Comb to the Schistose Rocks,' by J. G. MARSHALL.

FRIDAY.

'On a Dinosaurian Reptile (*Scelidosaurus Harrisoni*) from the Lower Lias of Charmouth,' by Prof. OWEN.

'On the Remains of a Plesiosaurian Reptile (*Plesiosaurus Australis*) from the Oolitic Formation in the Middle Island of New Zealand,' by Prof. OWEN.

'On the Elsworth Rock and of the Clay above it,' by H. SEELY.

'On the Sandstones and their associated Deposits of the Valley of the Eden and the Cumberland Plain,' by Prof. HARKNESS.

'On some Phenomena connected with the Drifts of the Severn, Avon, Wye and Usk,' by Rev. W. S. SYMONDS.

'On the Pleistocene Deposits of the District about Liverpool,' by G. W. MORTON.

'Notice of some Facts in Relation to the Post-glacial Gravels of Oxford,' by Prof. PHILLIPS.

SATURDAY.

'On a new Bone-cave at Brixham,' by W. PENGELLY.

'Remarks on the Bone-caves of Craven,' by T. W. BARROW.

'On the Red Crag Deposits of the County of Suffolk,' by W. WHINCOPE.

'Palaeontological Remarks upon the Silurian Rocks of Ireland,' by W. H. BAILY.—In this paper, the author noticed the occurrence of Llandovery flags in the county of Meath containing the

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characteristic Graptolite, *Didymograpsus Murchisonii*, and then proceeded to give a general review of the localities in Ireland from which fossils were obtained, as affording satisfactory evidence of the various sub-divisions of the Silurian rocks at present ascertained in that country.

'On the Geology of Knockgishowna, county Tipperary,' by A. B. WYNNE.

'On the Granite Rocks of Donegal, and the Minerals associated therewith,' by R. SCOTT, M.A.

'On the Gold of North Wales,' by T. A. READWIN.

'Comparison of Fossil Insects of England and Bavaria,' communicated by Mr. Stainton, by Dr. HAGEN.

SECTION D.—ZOOLOGY AND BOTANY.

President.—C. C. BARNINGTON.

Vice-Presidents—Prof. WILLIAMSON, Prof. OWEN, Dr. DAUBENTY.

Secretaries—Dr. ALCOCK, Dr. LANKESTER, Dr. P. L. SCLATER, Dr. E. PERCEVAL WRIGHT.

Committee—Dr. Alexander, J. Bentley, P. P. Carpenter, J. Clarke, R. D. Darbishire, J. Gwyn Jeffreys, J. Lubbock, R. M. Andrew, G. Odlivie, R. Patterson, H. T. Stainton, J. A. Turner, Rev. T. Hinks, Rev. R. Hoogen, A. Newton, Rev. H. H. Higgins, Dr. Collingwood, Prof. Archer, Dr. Edwards, G. Griffith, Prof. Rymers Jones, Rev. W. Simmonds, Dr. Jessen, J. P. Norman, G. S. Worthing, Dr. Dickinson, B. Birchall, Dr. Hector, Dr. Clisland, Dr. G. Ransome, Dr. W. Francis, Rev. H. B. Tristram.

THURSDAY.

The CHAIRMAN, in opening the meeting, gave no formal Address, but made some remarks on the advantages of meetings like those which had just commenced. The great object of science was the unfolding the laws by which the universe was governed, and one of the greatest encouragements to this study was the assembling together of men of kindred minds and kindred pursuits. Sometimes difference of opinion engendered feelings of an unpleasant kind, which personal intercourse served to remove; and thus these meetings, on account of their scientific and social value, had become increasingly appreciated.

'On the Cervical and Lumbar Vertebrae of the Mole (*Talpa Europea*, L.), by Prof. OWEN.—Few of our native quadrupeds have had their osteology more frequently described and studied than the common Mole, by reason of the singular and extreme modifications of certain parts of the skeleton, and their readily recognizable adaptation to the peculiar sphere and habits of life of the animal. He had not anticipated, therefore, in making a recent scrutiny of the skeleton, to find anything worth special notice that had not been noticed before, and could scarcely persuade himself that the fact he was about to communicate had escaped all previous observers. Had it been mentioned, however, in any special monograph on the *Talpa Europea*, which might have escaped his research, he thought it would have been considered worthy of a reference by the comprehensive and industrious Stannius, and might have led the sharp-sighted De Blainville to a more rigorous scrutiny of the vertebral column than he had bestowed upon it in his Monograph on the Osteology of the Mole—the last on that subject with which Comparative Anatomy has been enriched. Jacobs, in his generally minute and accurate monograph, when treating of the cervical vertebrae, notices only their spinous processes; and, after describing the large one of the Epistropheus, proceeds,—"Vertebrae colli ceterae processum spinosum habent nullum, et magis annulis similes sunt, quorum interstitia asperae arterie interstitiis similes sunt" (p. 14), and this description has been generally repeated. Cuvier writes:—"Dans les Taupes, elles (les cinq autres cervicales) ne forment élement que des simples anneaux entre lesquels il y a beaucoup de jeu." So likewise Prof. Robert E. Grant writes:—"The remaining cervical vertebrae are behind, like so many loose rings, shorn of their spinous and transverse processes, to allow of the freest motion with safety to the spinal chord." Prof. Bell more accurately states, "that in the Talpidae and the Soricidae the cervical vertebrae have strong transverse processes, and, excepting the second, do not possess any spinous processes." Prof. De Blainville, in a more detailed account of the skeleton, having express reference to the species under consideration (*Talpa Europea*), says:—"Les quatre dernières (vertèbres cervicales) se ressemblent en ce que leur arc, fort étroit, ne présente

aucune trace d'apophyse épineuse; les transverses sont également peu marquées, sauf le lobe inférieur de celle de la sixième, assez dilaté, du moins transversalement." If the cultivators of other, and more particularly of the exact, sciences were to judge of Zoölogy by the discrepancy of the testimonies adduced by some of the highest names in this science, as to a simple fact, easily determinable by observation, of one of our commonest native quadrupeds, they might conclude that the foundation of our generalizations in Comparative Anatomy reposed upon a very sorry and insecure basis, and that the method of obtaining the materials for such basis, by the first process of induction—the simple exercise of the eyes—stood in need of much improvement. For while one anatomist implies the absence of transverse processes in the cervical vertebrae of the mole by his silence, and another directly affirms their non-existence, a third describes them as being "strong," and a fourth as being "little marked." The fact is, that these so-called "transverse processes" are not only present in all the cervical vertebrae, but are variously and peculiarly developed, so as to give the mole the same advantage in strengthening and stiffening its neck, and impeding its lateral inflexions, which the crocodile derives from a similar modification of what might, with equal propriety, be termed in it the "transverse processes of the cervical vertebrae,"—viz., by their intricate or reciprocally overlapping arrangement, due to the shape and size of the costal elements of such transverse processes. But the mole has so far the advantage over the crocodile in this arrangement as that, whereas the costal part of the transverse process retains its fetal separation in the cold-blooded Reptilia, it becomes firmly ankylosed to the other parts of the transverse process in the small warm-blooded mammal. In a former memoir, 'On the Processes of Vertebrae,' Prof. Owen had given the results of an analysis of the "cervical transverse process," showing it to consist of the autogenous "pleurapophysis," combined with the exogenous "parapophysis" and "diapophysis." In the mole the pleurapophysis joins the diapophysis, circumscribing the vertebral foramen, and developing a short process from the point of junction; in the third vertebra the pleurapophysis, or costal part of the "transverse process," is compressed and produced backwards and a little outwards and downwards, overlapping the anteriorly produced part of the pleurapophysis of the fourth cervical. This portion of the "transverse process" much resembles the corresponding but separate element in the same vertebra of the crocodile, except that it is "sessile," instead of being supported on a short peduncle; it is, for example, broad, compressed, and produced downwards, forwards and backwards; its larger and longer posterior portion overlapping the anterior end of the pleurapophysis of the fifth vertebra, as the same part of itself is overlapped by the pleurapophysis of the third vertebra; the posterior part of the pleurapophysis of the fourth cervical of the mole is further interlocked between the pleurapophysis of the fifth cervical below, and the anterior zygapophysis of the same vertebra above. The pleurapophysis of the fifth cervical resembles that of the fourth. In the sixth cervical it is much more developed, both forwards, backwards and downwards; the pair forming the sides of a deep and wide channel on the under part of that vertebra. In the seventh cervical the pleurapophysis is not developed; the diapophysis forms a small obtuse prominence below the interior zygapophysis, and, in the ordinary language of Anatomy, its "transverse process" would be said to be "imperfurate." With regard to the common description of the cervical vertebrae of the mole as mere rings of bone, the term is applicable only to the neural arches of the five last vertebrae, none of which have a spine, except the third and seventh, and in these it appears as a mere tubercular beginning. The bodies of the vertebrae are subdepressed, but otherwise are well-developed quadrate bones, closely united, so as to concur with the peculiar size, shape and arrangement of the "transverse processes" above described, to give strength to the neck and impede any lateral

inflexions. It is easy to show on a recent mole, when the cervical vertebrae are exposed by removal of the enormous masses of muscles with which they are surrounded, that the lateral inflexions of the neck are confined to movements between the *atlas* and *dentata*, the *dentata* and the third vertebra, and between the sixth and seventh vertebrae, but are as effectually impeded in the intervening vertebrae as in the crocodile itself. Nor is the movement upwards and downwards between the same vertebrae of more than a limited extent. The osseous style developed in the *ligamentum nucha*, co-extensive with the cervical series, and running parallel with the course of their undeveloped spines, stiffens the neck in respect of its vertical inflexions beyond the atlas, as well as augments the lever power of the muscles which raise the head. If the service to a mole of a stiff neck in the fossorial applications of the snout and head had been called to mind, the analogy of the more efficient modification to that end in the burrowing armadillos, might have led to an examination of the actual structure of this part of the skeleton of the mole, which would have rendered unnecessary the present communication on the subject. One of the objects Prof. Owen had in view in troubling the Section with what some might deem too trifling a matter, was to encourage younger comparative anatomists to exercise their skill on indigenous subjects, which may any day be brought within their reach. Their organization is far from being exhausted by direct and original scrutiny, and the highest generalizations in Comparative Anatomy might be tested and illustrated by the anatomy of our commonest fishes, reptiles, birds and mammals, independently of rarities from foreign shores. Prof. Owen's residence in Richmond Park had procured him facilities for examining moles, hedgehogs, &c., which might supply subjects for future communications. In conclusion, he might further state respecting the mole, that its loins were strengthened by super-additions to their vertebrae, precisely like those discovered by Sir Philip Egerton in the cervical vertebrae of the *Ichthyosaurus*; viz., by a series of "subvertebral wedge-bones" infixed into the inferior interspace between each of the six lumbar vertebrae, as well as between the first lumbar and last dorsal, and between the last lumbar and the first sacral. These which Prof. Owen had determined to be "autogenous hypapophyses," have their broad, rhomboidal, smooth and slightly convex base downwards; and their narrower end wedged upwards into the lower part of the intervertebral substance. It is obvious that the lumbar region, co-operating with the pelvis, as the fulcrum during the vigorous actions of the hind feet by which the loose earth is kicked out of the burrow, must derive an advantage from this super-addition to their fixation, analogous to that which the *Ichthyosaurus* derived from the wedge-bones of its cervical vertebrae. The lumbar hypapophyses of the mole had not escaped the notice of the sharp-sighted Jacobs, who speaks of them as "ossicula sesamoides" (loc. cit. p. 17); but he deduces no physiological consequence from the fact; and this passing notice had not been recognized by any subsequent writer on the osteology of the Insectivora. From no systematic work or monograph on Comparative Anatomy, indeed, could the student acquire any hint of so curious a fact that the vertebral column of the mole combined two peculiarities which are separately given, in the Reptilian class, viz., to the Crocodilia and the Enaliosauria respectively. This paper was illustrated by diagrams of the structures described.

Prof. OWEN afterwards read a paper 'On some Objects of Natural History from the Collection of M. Du Chaillu,' of which the following is a summary:—Prof. Owen's first knowledge of the zoological collection was derived from a letter sent by M. Du Chaillu, dated Gaboon, June 13, 1859, and received in the British Museum in August, 1859, in which M. Du Chaillu specified the skins and skeletons of the gorilla or *n'gema*, *kooloo-kamba*, *nchiego*, and *nchiegombowie* which he had collected, offering them for sale, with other varieties, to the British Museum. Prof. Owen replied, recommending the transmission of the collection to

London for inspection, with which recommendation M. Du Chaillu complied, bringing with him all the varieties he had named, with other objects of natural history, from which he permitted selection to be made. The skins of the adult male and female of the young of the troglodytes gorilla afforded ample evidence of the true colouration of the species. In the male, the rufo-griseous hair extends over the scalp and nape, terminating in a point upon the back. The prevalent grey colour, produced by alternate fuscous and light grey annulations of each hair, extends over the back, the hair becoming longer upon the nates and upon the thighs. The dark fuscous colour gradually prevails as the hair extends down the leg to the ankle. The long hair of the arm and forearm presents the dark fuscous colour; the same tint extends from below the axilla downwards and forwards upon the abdomen, where the darker tint contrasts with the lighter grey upon the back. The scanty hair of the cheeks and chin is dark; the pigment of the naked skin of the face is black. The breast is almost naked, and the hair is worn short or partially rubbed off across the back, over the upper border of the iliac bones, in consequence, as it appears, of the habit ascribed by M. Du Chaillu to the great male gorilla of keeping at the foot of a tree, resting its back against the trunk. The skin of the great male gorilla, as mounted in the British Museum, exhibits two opposite wounds,—the smaller in front on the left side of the chest, the larger close to the lower part of the right blade-bone. Two of the ribs in the skeleton of this animal are broken on the right side near where the charge had passed through the skin in its course outwards. These marks correspond with the account of the slaughter of the great gorilla given by M. Du Chaillu. Prof. Owen proceeded to describe the colour of the female gorilla, which, it appears, was generally darker and of a more rufous tint than the male. In one female the rufous colour so prevailed as to induce M. Du Chaillu to note it as a red-rumped variety. In the young male gorilla, 2 ft. 6 in. in height, 1 ft. 7 in. in length of the head and trunk, and 11 inches across the shoulder, the calvarium is covered with a well-dressed "skull-cap" of reddish-coloured hair. The back part of the head behind the ears, the temples and chin are clothed with that mixture of fuscous brown and grey hair which cover with a varying depth of tint the trunk, arms and thighs. The naked part of the skin of the face appears to have been black, or of a very dark leaden colour; a few scattered straight hairs, mostly black, represent the eyebrows. A narrow moustache borders the upper lip, the whole of the lower lip and sides of the head are covered with hair of the prevailing grey fuscous colour. The rich series of skulls and skeletons brought home by M. Du Chaillu illustrate some most important phases of dentition. These phases were specified by Prof. Owen at length. The deciduous or milk dentition, it was remarked, were in the youngest specimen of the gorilla something similar to those of the human child, but an interspace equal to half the breadth of the outer incisor divides that tooth from the canine, and the crown of the canine descends nearly two lines below that of the contiguous milk molar. The deciduous molars differed from those of the human child in the more pointed shape of the first, and much larger size of the second. The dentition of the young gorilla corresponds best with that exemplified in the human child between the eighth and tenth years; the difference, however, is shown in the complete placing of the true molar, whilst the premolar series is incomplete. It was worthy of remark, also, that in both specimens examined the premolars of the upper jaw had preceded those of the lower jaw, and that the hind premolar has come into place before the front one. In the later development of the canines and the earlier development of the second molars of the second dentition the gorilla differs, like the chimpanzee and the orangs, from the human order of dental development and succession. An opportunity of observing this order in the lower races of mankind is rare. Prof. Owen availed himself of the opportunity in the case of the male and female dwarf Earthmen from South Africa, exhibited in London. He found dentition at the phase indicative of the

age of from seven to nine in the English child; other indications agreed with this evidence of immaturity. The children were dressed and exhibited as adults. Both showed the same precedence in development of canines and premolars which obtains in the whole race. Referring next to the variety of the chimpanzee brought by M. Du Chaillu from the Camma Country and from near Cape Lopez, Prof. Owen remarked that this species accords specifically in its osteological and hirsute development with the *Troglodytes niger*. It is stated by M. Du Chaillu to be distinguished by the natives of Camma as the *nschigombio* from the common chimpanzee (*Troglodytes niger*), called by them the *nschigo*. From the character of the skins of the male and female specimens of this species brought by M. Du Chaillu to London, Prof. Owen would have deduced evidence of a distinct and well-defined variety of *Troglodytes*.

The reading of this paper was followed by a discussion in which Prof. OWEN, DR. LANKESTER, and M. DU CHAILLU took part. Prof. OWEN, on being requested to point out the principal distinctions between man and the gorilla, drew attention to the fact of its inability to stand on its hind legs, and the multitudinous points of adaptation in structure which such an incapability demanded. He also went into the details of the anatomical structure of the brain in the monkey tribes, and insisted on the great differences of structure which that organ presented in man and the quadrumania. Independent of the great size of the brain in man, it possessed certain parts, as the hippocampus minor, which existed only in an undeveloped or rudimentary condition in the monkeys.

Dr. WRIGHT, of Dublin, read the following communication from Dr. J. E. Gray, 'On the Height of the Gorilla.'—Much difference occurs in the statements of travellers and others with reference to the height of the great African ape. Bowdich, the first traveller by whom it was mentioned, under the name of the *Ingēna*, states it, on the authority of the natives of the Gaboon, to be generally 5 feet high; but, in some recent notices, it has been asserted to reach the height of 6 feet 2 inches; and the specimen exhibited at the meeting of German naturalists at Vienna is said, on good authority, to have measured more than 6 feet in height. The measurement of a stuffed skin without bones is necessarily delusive, depending as it does, firstly, on the mode in which the skin has been originally prepared, and, secondly, on the extent to which the artist may be disposed to stretch it. Such measurements are not to be relied on unless they are in accordance with those of the bony skeleton; and it, therefore, occurred to me that it would be desirable to measure the long bones of the limbs of the different skeletons existing in the British Museum, the osseous structure giving the only certain dimensions on which reliance can be placed. The skeletons in the British Museum are six in number, viz.,—1. A skeleton, obtained from Paris by Prof. Owen, and mounted in the best French manner;—2, 3, 4. Skeletons of male, female and young, purchased from M. Du Chaillu;—5. A skeleton of a male, purchased at Bristol, of which we have also the stuffed skin;—6. An imperfect skeleton, purchased from M. Parzudaki, of Paris. The measurements of the several bones of each of these skeletons are given in the following table.

	Humerus.	Ulna.	Radius.	Femur.	Tibia.	Fibula.
Articulated specimen from Paris . . .	17	14	13	14	11	10
Skeleton from M. Du Chaillu's stuffed specimen (called the "King of the Gorillas")	16	14	13	13	11	9
Skeleton of young male, from the specimen purchased at Bristol . . .	14	11	15	9		
Imperfect skeleton, purchased of M. Parzudaki	12	11	10	11	9	
Skeleton of female, purchased of M. Du Chaillu	13	11	10	11	9	7
Skeleton of young male, purchased of M. Du Chaillu	12	11	9	10	8	7

They were taken by Mr. Gerard with a tape measuring inches and quarters of inches only, but

are quite sufficient for a comparison between the specimens themselves, and as affording materials for determining the actual height of the animal. As the largest of these (viz., the Paris specimen, photographed for the Trustees of the British Museum by Mr. Fenton) stands 5 feet 2 inches in height, we are justified in concluding that to be in all probability the extreme natural height of the full-grown animal.

Mr. J. G. JEFFREYS exhibited specimens of the *Sphenotrochus borealis* of Fleming, which had been taken in the dredge off the coast of Zetland.

Dr. OGILVIE read the Report of the Aberdeen Dredging Committee.—At the Aberdeen Meeting of the British Association a Committee was appointed for the purpose of carrying out a system of dredging on the north-eastern coast of Scotland, consisting of Dr. Ogilvie, Dr. Dickie, Prof. Nicol, Dr. Dyce, and Mr. Peach, and 25*l.* was allotted to Mr. Peach to enable him to conduct investigations at Wick. In 1860, the few weeks available for dredging, previous to the Meeting of the Association in July, were so tempestuous and generally unfavourable that no part of the grant was expended; but in the course of the autumn a trial was made off the coast of Banffshire. During the past summer, 1861, several dredging expeditions were planned and completed off the bay of Aberdeen and adjacent coast, none exceeding a distance of twelve miles from land. The Committee in Aberdeen considered it advisable to receive the aid of others besides Mr. Peach, and to have trials made at points intermediate between Aberdeen and Wick, in order to render the investigations more complete; and with this view the assistance of the Rev. W. Grigor, of Macduff, was asked and readily accorded, a part of the grant being allotted to him. They have also secured the co-operation of another zealous naturalist, Mr. Dawson, of Cruden. This gentleman has just put at their disposal a valuable and interesting Report on the Mollusca of Cruden Bay, but the others have not yet had sufficient time to allow of any report; and at Aberdeen the materials collected during the several expeditions being still in progress of examination, the Committee are under the necessity of reserving the details for a further report. The general results, however, have been such as to lead them to hope that the sum of 25*l.* will be granted for one year more, in order that the dredging may be further carried on, and at greater depths and distances from land. No regular dredging has previously been conducted on this part of the Scottish coast, but the Committee have now the satisfaction of observing, that, owing mainly to the admission of parties of students of the University to the dredging excursions, a feeling of interest has been awakened in the pursuit, from which the best results may be anticipated; and there can be no doubt that several ardent young men have thus been thoroughly trained in carrying on such operations in the open sea. The Committee would urge these as reasons for a renewal of the grant, that they may be thus enabled to procure materials for a complete report at the Meeting of the Association in 1862.

'On the Anatomical Characters of Cyprea,' by Dr. T. ALCOCK.—In this paper the author gave the results of a more detailed anatomical examination of the species of the genus *Cyprea* than had hitherto been made.

'On the Relation between the Pinnate and Palmate Leaves,' by T. M. MASTERS.—The author gave examples of transition from one form of these leaves to another, showing that the form depended on the relative growth of different parts of the leaf.

Dr. LANKESTER said that the forms of all leaves depended on the relative growth of the woody and cellular tissue of the leaf. He objected to the terms *nerves* and *veins* as applied to the vascular tissue of leaves, and proposed to substitute the more appropriate term *ribs*.

'Brief Summary of a Report on the Flora of the North of Ireland,' by Dr. G. DICKIE.—The district to which the Report refers comprehends that part of Ireland which lies to the north of a line passing to the west from Dundalk, embracing ten entire counties and part of other two. The information respecting the native Flora of this district

has been derived mainly from the following sources: Dr. Mackay's 'Flora of Ireland,'—a valuable list contributed by D. Moore, Esq., of the Glasnevin Botanic Garden,—notes contributed by Mr. Hyndman, of Belfast,—the manuscripts of the late Mr. Templeton, of Cranmore, liberally placed at the author's disposal by Mrs. Templeton,—and, lastly, records of species observed by the author himself during excursions to different parts of the north of Ireland. Details will be given in the full report for insertion in the next volume of the *Transactions* of the Association. It will be sufficient here to give a summary of the results. The standard adopted is the 'British Flora' by Sir W. J. Hooker and Prof. Arnott; and in order to bring out the botanical features of the district, the types of Mr. Watson (in his 'Cybele Britannica') afford the best means for comparison. The total number of species of Phanogams in the district may be estimated at 725. In the entire Flora of the United Kingdom, those of the English type are 396; the Scottish, 68; Highland, 108; Germanic, 196; Atlantic, 40. In the district there are 166 of the English type, 39 Scottish, 22 Highland, 17 Atlantic, and 3 only of the Germanic type; the remainder, of course, embracing those of general occurrence in Britain, hence called the British type. The Flora, therefore, is characterized by a large admixture of species belonging to the English and Scottish types, with a fair proportion of those called Western, or Atlantic. The number of Highland species is small, as might have been expected, owing to the physical characters of the country. Those of the Germanic type are still fewer; only 3 out of 196 British species referred to that type.

FRIDAY.

'Report on the best Mode of preventing the Ravages by Teredo and other Marine Animals in our Ships and Harbours, for the Consideration of which a Committee was formed at the last Meeting of the Association,' by Mr. JEFFREYS.

'Preliminary Report on the Dredging Committee for the Mersey and Dee,' by Dr. COLLINGWOOD and Mr. BYERLEY.

Mr. M'ANDREW read a short account of the proceedings of the General Dredging Committee. This Committee has now been organized, and Mr. J. G. Jeffreys has undertaken the duties of reporter of the correspondence of the various local dredging committees.

In the course of the discussion which the reading these Reports led to, Mr. JEFFREYS stated that the several results of the labours of the dredging committees confirmed Edward Forbes's law, that the species which had the greatest vertical depth had the greatest horizontal range. At the same time, the law was not absolute, as the changes which had taken place in the elevation and depression of the sea-bottom since the last geological epoch had undoubtedly produced many local disturbances in the distribution of both plants and animals. He pointed out, however, the necessity of an accurate investigation of forms in order to determine their distribution.—The Rev. Mr. HINCKS observed, with regard to the record of the existence of *Coryne pusilla*, that it was very desirable that the particular variety should be stated. He knew many varieties of this form of polyp, but knew of no book or paper where they were all recorded.—Mr. PATTERSON announced that Prof. Wyville Thompson, during his dredging this summer off the Shetland Islands, had procured five perfect specimens of the *Cidaris papillosea*. Of this fine sea-urchin, known as the piper, only the spines had been taken by previous naturalists.

'Report on the Present State of our Knowledge of the Genus Apteryx, living in New Zealand,' by P. L. SCLATER.

'On the Ovicells of the Polyzoa, with Reference to the Views of Prof. Huxley,' by the Rev. T. HINCKS.—In this paper the author stated that in certain forms of Polyzoa he had discovered, first, cells which developed into regular ova; secondly, cells which became absorbed, and contributed to the development of normal ova.

Mr. LUBBOCK stated that he had observed the same distinctions in the ovicells of bees and butterflies.

'On the Influence exerted by Light on the Func-

tion of Plants,' by Dr. DAUBENY.—The author described certain principles published by him in the *Philosophical Transactions* in the year 1836, in the course of which he established, firstly, that the decomposition of carbonic acid and the consequent disengagement of oxygen was influenced chiefly by the luminous rays of the spectrum, and not by the calorific or actinic ones; secondly, that under particular circumstances, nitrogen is emitted during sunlight from the leaves of plants; thirdly, that other functions of plants, such as the greenness which the leaves assume, the peculiar property which belongs to certain ones, as to the sensitive plant, the exhalation of water from the leaves and its absorption by the roots, are probably dependent upon the same influence, &c. Dr. Daubeny briefly reviewed the various points comprised in the subject he selected for consideration, and submitted representations on paper illustrative of the operations of light under various circumstances.

Dr. DAUBENY also read a paper 'On the Functions discharged by the Roots of Trees,' and made some observations 'On a Violet peculiar to the Calamine Rocks, in the neighbourhood of Aix-la-Chapelle.'—In these papers the author called attention to the selective power possessed by the roots of plants as indicative of a force independent of any explanation from physical causes, and which he therefore regarded as vital.

Dr. LANKESTER objected to the term "vital" as indicating the existence of a force independent of physical forces. All we knew of the functions of animals and plants increased the conviction that they were dependent on physical forces. The selective power of roots was no greater proof of a vital action than the selective power possessed by the crystals of minerals on compound solutions.

SUB-SECTION D.—PHYSIOLOGY.

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THURSDAY.

'On the Connexion between the Functions of Respiration and Digestion,' by Dr. G. ROBINSON.

'Report on the Influence of Prison Dietary and Punishments on the Bodily Functions of Prisoners,' by Dr. E. SMITH and J. R. MILNER.

'On the Existence and Arrangement of the Fovea Centralis Retinae in the Eyes of Animals,' by Prof. H. MÜLLER.

'On Chloroform Accidents, and some new Physiological Facts as to their Explanation and Removal,' by Dr. C. KIDD.

'On the Action of Lime on Animal Matter,' by Dr. J. DAVY.

FRIDAY.

'On the Physiological and Medicinal Properties of Sulphate of Aniline, and its Use in the Treatment of Chorea,' by Dr. J. TURNBULL.

'Report of the Influence of Prison Dietary and Punishments upon the Bodily Functions of Prisoners, Part II.,' by Dr. E. SMITH and J. R. MILNER.

'On the Action of the Eustachian Tube in Man, as demonstrated by Dr. Politzer's Otoloscope,' by J. TOYNEBEE.

'On the Blood of the Common Earthworm,' by Dr. J. DAVY.

'On Certain Points in the Anatomy of the Insectivora,' by Dr. G. ROLLESTON.

'Upon the Influence of the Sympathetic Nerve on Voluntary Muscles, as witnessed in the Treatment of Progressive Muscular Atrophy by Secondary Electric Currents,' by Prof. REMAK.

SATURDAY.

'On the Structure and Growth of the Elementary Parts (Cells) of Living Beings,' by L. BEALE.

'On the Question whether the Hair is or is not subject to Sudden Change in Colour,' by Dr. J. DAVY.—The popular notion is decidedly in favour of the affirmative, and many naturalists and physiologists have come to the same conclusion. They adduce instances of the change of the hair to white or grey, in the case of persons under strong emotions

of grief or terror. Haller, in his 'Elementa Physiologie,' refers to eight authorities for examples of such changes; but all that he seems to admit for himself is that under the influence of impaired health such a change may take place slowly. Marie Antoinette was cited by favourers of the popular notion as a striking and well-authenticated instance; but when fairly considered, the case came under the condition admitted by Haller. Had it been possible for mental emotion, whether of terror or of grief, to render hair suddenly grey, surely in the Queen's case the change should have been witnessed at an earlier period than that of the arrest of the Royal Family in their attempt to leave France. If such a sudden change could be presumed, might we not expect to witness it in soldiers engaged in an active campaign amidst all the dangers and horrors of war? He had himself examined thousands of soldiers, men prematurely worn out in various climates, and concerned in many a hard-fought battle—many of them grievously wounded—but he never met with an instance of the kind. The case of a rebel Sepoy is stated by Dr. Laycock, in the April number of the *British and Foreign Medico-Chirurgical Review*, on the authority of Surgeon Parry; it being said that the man's hair changed from black to grey in half-an-hour. He was undoubtedly under the belief that he would be condemned to death. Might not this be the explanation? The man was hurried in, profusely perspiring; he was naked, and cooling and drying rapidly, his hair, previously grey, being darkened by moisture, resumed its natural colour. The effect of water in intensifying colour is well known; and a further circumstance in aid of the explanation given may be found in the fact that the natives of Bengal are in the habit of staining their hair. The *Transactions* of the Royal Society, extending over 200 years, do not contain an instance of such change in the colour of the hair: a circumstance opposed to the conclusion that it ever took place, for had it ever been undoubtedly witnessed, it is not likely that it would have remained undescribed. The author is not aware that, irrespective of recorded evidence, anything in support of the popular notion can be adduced on physiological grounds. Human hair cannot be injected. Using colouring fluids, such as a solution of nitrate of silver and a solution of iodine, the author has not observed any change of colour, except in the portions actually immersed. Whether it owes its colour to a fixed oil, to a peculiar arrangement of its constitutional molecules, or to both, it resists decay in a remarkable manner; it resists the action of acids and alkalis, except the strongest, which dissolve it. It resists maceration, and even boiling water, except continued for a long time, and under pressure, when it suffers disintegration and decomposition. Exposure to the sun will bleach hair, but this will not account for any very sudden change of colour. Supporters of the popular opinion refer to changes in the plumage of birds, such as the ptarmigan, and in the hair of certain quadrupeds, such as the mountain hare and ermine, which become white towards winter, and of a darker hue when the winter is passed. The belief is rested on, that this is not caused by moulting, or a change of coats, but that it takes place in the existing feathers and hair. But there is no satisfactory evidence of such changes; and considering the qualities of both, they seem most improbable. There is good proof that in the ptarmigan the change is decidedly connected with moulting; at least such is the author's decided impression from inspecting the numerous specimens, shot at different seasons, belonging to Mr. Gould—which eminent ornithologist says, that the "ptarmigan is always moulting," the changes being from brown in the summer, to speckled in the autumn, and white in the winter. The speckled feathers, few and large, overlap the white; and as soon as those few are shed, the bird appears in its white dress. The similar change amongst quadrupeds most probably arises from the same cause; and examples, less striking than those amongst wild animals, can be observed in cases of the horse and the cow. Prof. Rolleston, of Oxford, had given to the author a portion of the hair of a pony which has been observed to change its coat from tawny to nearly white in winter. Mr. Erasmus

Wilson, who advocates the popular doctrine, refers to the case of a lemming in support of his views; but Mr. Blyth, a naturalist, says that he examined a lemming killed during its autumnal change, and satisfied himself that "the white hairs were all new, and not the brown changed in colour." There are reasons why it might be expected that the summer coat and plumage should be darker than those of the winter. The author concludes that whether we consider one side of the question or the other—the human evidence so questionable, the physiological so much more reliable—the idea of fallacy is unavoidable, as to the hair being subject to sudden change of colour from mental impression. The attempts made to explain such a change by physiologists are allowed to be complete failures; and more amusing attempts had been made to explain the phenomenon on other grounds than those of fallacy. The author, when on foreign service, knew an assistant surgeon of a regiment who had become insane, and whom he visited a fortnight or three weeks subsequently. The patient's hair, before brown, had become grey; but when he called attention to the fact, the regimental surgeon simply said, "Your surprise will cease, when you know that—has, since he has been afflicted with his malady, discontinued dyeing his hair." When we consider how prone the hair of some persons is to turn grey at an early age, even without accompanying or preceding bodily ailment, and how many would wish to conceal this blemish, and so have recourse to chemical means, it is easy to imagine that this source of error may not be unfrequent. Nor should it be overlooked that there is a disposition in some to make statements merely for the sake of exciting momentary surprise or of acquiring ephemeral notoriety. If we consult the records of imposition and delusion, we shall find many a thing attested, and for a time believed, of as marvellous a kind as the sudden whitening of the human hair. Has not witchcraft had its defenders? Have not table-turning, clairvoyance, and spirit-rapping had believers? Have there not been even physiologists who have given their credence to spontaneous combustion of the human body, and to equivocal generation?

'Physiological Researches on Resuscitation,' by Dr. B. W. RICHARDSON.

'On some Points in the Anatomy of Insectivora,' by Dr. Prof. ROLLESTON.

'On certain Points in the Anatomy and Physiology of the Dibranchiate Cephalopoda,' by A. HANCOCK.

'Observations on the Encephalon in Mammalia,' by R. GARNER.

'On the Occipital Vertebra in Osseous Fishes,' by C. ROBINSON.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

President—J. CRAWFORD.

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THURSDAY.

'On the Connexion between Ethnology and Physical Geography,' by the PRESIDENT.

'On the Direct Overland Telegraph from Constantinople to Kurrachee,' by Major-Gen. Sir H. C. RAWLINSON.—In 1858 the Turkish Government undertook to execute, at its own expense, a line of telegraph from Constantinople to Bussorah, which would form an integral portion of the great line connecting India with Europe. It was foreseen that the line would be convenient both for the requirements of the Turkish trade and the purposes of Turkish government, and would thus benefit the empire; but the money return for the outlay was to be sought in the tariff established for British messages transmitted along the line towards India.

The British Government engaged, as soon as there was a fair prospect of the completion of the Turkish undertaking, to carry on the communication from Bussorah to India at its own expense. Some of the officers originally engaged in the undertaking had retired, but three of Lieut. Holdsworth's *employés*, Mr. Carthew and the brothers McCullum, remained in the country, and, mainly owing to their zeal and skill, the line was now in a working and efficient state the whole way from Constantinople to Bagdad. The Porte had declined to accede to a proposition that Her Majesty's Government should incur half the expenses of the improvements, but had formally engaged to carry out all Col. Kemball's recommendations for giving greater efficiency to the line at his own expense. A submarine cable from Pera across the Bosphorus having been frequently damaged by the anchors of vessels, it was proposed to suspend a wire from the European to the Asiatic side at the narrowest part of the strait—a distance of not more than 1,000 yards. Precautions had been taken as security against interruption from the Arabs, Kurds, &c. by the line of telegraph being taken from Marden along the chain of the Masius, where there are located a great body of Jacobite Christians. Col. Kemball reported favourably of the progress of efforts to conciliate the Arab chiefs living near the outer ranges of the Kurdish mountains. The telegraph consisted of two distinct wires, one of which was reserved for the exclusive use of the British Government; and a convention was about to be signed with the Turkish Government for the regulation of the respective shares of the expense to be incurred in keeping the line in working order, for fixing the tariff for the transmission of messages, &c. With reference to the Persian section of the line, attention was being more immediately directed to a continuation of the land-line from Bagdad, through Persia, towards India. Political and physical arguments showed the desirability of taking a northward line, and the author believed that it had been decided to continue the line, in the first instance, directly from Bagdad to Teheran, thence to Khanikien and Kermanshah. From the latter place it would continue to follow the great high road from Babylon eastward. At Teheran the line would join another system of telegraphs, which had been organized in Persia itself. From Bagdad it was proposed to continue the line to Bunder Abbas; and it was almost certain that the Shah would enter cordially into the scheme. The Commissioner in Scinde, the agent for the Government of India, and the Imaum of Muscat, had reported as favourably as could be wished. They were working in what he believed, in the present state of oceanic telegraphy, to be the only practicable direction.

The PRESIDENT remarked, that if Manchester and Calcutta and Bombay were to be brought into communication in ten or fifteen minutes, as they ought to be, it must be by land, and not by sea. Our oceanic cables had been total failures. We had sunk two or three millions of money, which might as well have been thrown in the form of sovereigns into the Red Sea. Pharaoh had lost his chariots and horsemen; but this country had lost a sum amounting to 50,000*l.* per annum for the next fifty years—a monstrous sum to spend, and to spend for nothing.—General CHESNEY stated that Capt. Lynch, who was out with him at the first forming of the Company, had sent out a vessel (in pieces) to navigate the lower part of the Euphrates, and intended opening a communication with Kurrachee. England required several lines of telegraph, and they should endeavour to secure the one through Persia, as well as that through Arabia. He knew sufficient to believe that the carrying out of the line would be perfectly easy.—Capt. CHARLWOOD, R.N., thought the proposed route was as good a one as could possibly be taken, and that the Euphrates Valley was a perfectly feasible line for the telegraph as well as the railway, to be carried on to India. Communication could thus be established between Britain and Hindostan, Calcutta and London, Manchester and Bombay.

'Remarks on the Proposal to form a Ship

Canal between East and West Loch Tarbert, in Argyllshire,' by J. RAMSAY.

'On the Ethnology of Finnmark, in Norway,' by L. DAW, of Christiania.

FRIDAY.

'Remarks on a Proposed Railway across the Malay Peninsula,' by H. WISE.

'Notices on the Ethnology, Geography, and Commerce of the Caucasus,' by Capt. CAMERON.

'On the Geography and Natural History of Western Equatorial Africa,' by P. B. DU CHAILLU.

'On the Acclimatization of Man,' by Dr. J. HUNT.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

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THURSDAY.

'A Glance at the Cotton Trade,' by T. BAZLEY.

—A century ago the population of Manchester was below 30,000, whilst now 350,000 persons reside in and occupy it. Population and wealth have wonderfully increased and ramified to other places; but now, in the zenith of prosperity, a mysterious hand has written upon our walls the words of caution and of admonition. During the last fifty years upwards of 20,000,000,000 pounds weight of cotton from all sources have been consumed in Great Britain, and the value would be probably not less than 750,000,000*l.* sterling, or might equal a sum of the amount of our National Debt, the chief supply having been obtained from the United States of America. Upon a fair computation, the import of that material, which has so largely employed the capital and labour of this country, has yielded a profit of not less than 1,000,000,000*l.* sterling to the people of the United Kingdom within that period. The wonder is, that so large a supply of cotton could be procured from that one source, the United States; and when we reflect that this country possesses a monopoly of the vast extent of territory found in the whole world capable of producing this raw material, the inference is most palpable, that there has been developed the most successful agricultural industry in the States of America which has been either ever contemplated or realized; whilst in British colonies and dependencies apathy and neglect have prevailed. If the legislature had little sympathy with the great industry of Lancashire, the interests of our foreign possessions might have induced our rulers to stimulate productions in them, which would have found compensating markets at home. The advocates of large and of independent supplies of raw cotton, from all possible sources, have never desired Governmental favours, their object having been to promote the removal of repressing obstacles, and to procure, by the aid of a sound colonial policy, at least a fair share, in proportion to the extent of our foreign possessions, of not only cotton, but of every other product which they might more abundantly have yielded. During the last year the consumption of cotton in Great Britain was 85 per cent. from the United States, 8 per cent. from other foreign sources, and 7 per cent. from British territory. The present position of the trade is most precarious and dangerous. Existing stocks and prospective supplies of cotton may enable the mills to be worked into the spring of next year, at moderately full time; but afterwards, unless supplies be received from the United States, independent sources can only furnish the means of keeping the mills at work little more than one day in the week. With the growth of this industry 5,000,000 of our population have become, directly and indirectly, dependent upon it for their subsistence; and the productiveness of their capital and labour, including the raw material, was for the last year nearly eighty million pounds sterling. Of this large value twenty-five millions of cotton

manufactures were absorbed in the consumption of the people of the United Kingdom, and there remained for exportation fifty-five millions. The estimated capital engaged in its fixed and floating investments, is two hundred million pounds. Now, when we contemplate the vast interests involved in this surprising trade, seeing that the people employed and connected with it exceed the population of the kingdom of Belgium, of Holland and of Portugal; that the national treasury receives from it an amazing sum in aid of the expenses of the State; that a commercial marine of unparalleled magnitude derives support from it; that the comfort and happiness of the labourers employed in it are imperilled by any indications which threaten to disturb its existence and prosperity; and that its suspension, or serious curtailment, would even endanger the general weal; we may well inquire what efforts have been made to sustain the usefulness, prosperity and permanency of this source of national riches. That the cotton trade should have rested chiefly upon the one supply of the States of America for its very means of existence, every good and every wise man has deplored; but that to produce that supply the portion of the human family which is most defenceless should be held in the degradation of slavery is abhorrent to the feelings of the righteous, of the humane and of the benevolent. Most effectually to suppress slavery will be to supersede the necessity for the labour of the slave, and if the chiefs of Africa could be induced to cultivate sugar, cotton and tobacco upon their own soil they need not expel and degrade their labourers. Of the commercial policy of the United States of America censures can scarcely be too severe. In the Northern States protection has prevailed, and the people of the South have been compelled to pay extravagant and monopolist prices for the manufactures produced by their own agricultural labour, and which, in the form of cotton, has been received in this country free from every tax. The North has robbed the South by unjust exactions, and the South has robbed the negro of life and liberty! Why the British manufacturer has tamely submitted to an import tax of 30 per cent. upon cotton goods entering the States of America, whilst the raw cotton, the growth of those States, has been received here free from tax or impost, without making an effort to procure supplies of his raw material from free labour with the right to send free exports in exchange, can only be accounted for by the anxiety to possess an apparent immediate benefit at the cost of advantages more enduring, but which could only be regarded as of prospective, or future, possession. Partial and unjust government has at length reaped the fruit of convulsion, and for which unjust policy had sown the seed. The North has taxed for its own protection and advantage the people of the South and their industry; and the South has held in degradation, oppression and slavery the labourers who have enriched their owners. Mutual wrongs have been committed, and hitherto no just object appears before the world as a cause of the lamentable struggle which is exhausting both of them. But slavery is doomed. A protective system has been fostered in the North, founded very extensively upon the pirated inventions of this country, and by the agency of which our manufactures have been largely excluded from the markets of the States. Even their very literature has been abstracted from the intellectual faculties of those in their fatherland who have only their cultivated minds and soul-breathing thoughts for their inheritance. In addition to these grave reasons, which mainly affect the morality of the States, this country has been paying a tribute of five million pounds sterling per annum to those States in excess of the price at which cotton could be remuneratively produced and sold. With the convulsion which exists in America, with the adverse commercial policy dominant there, and with the inhuman system of slavery which prevails in the cotton-producing districts, what are the duties which devolve upon our governing and mercantile classes? If by the convulsion of the States we are taught our national, as well as commercial, duties, the lesson will be ultimately beneficial. Whether it has been wise for our Government to see con-

tinually increasing the dependence of this great trade upon the one chief supply of its raw material, and that source adverse in interest, and oppressive to its own labour, we can only answer in the negative. With the East and West Indies, with tracts in South, East and West Africa, and with land in Australia as extensive as Europe, capable of growing cotton from the lowest to the highest qualities, it is a national reproach to us that we have permitted our own fields to be uncultivated, and that our spinners and manufacturers have been driven by necessity to consume the produce of slavery. Lacking the means of communication and of irrigation, the resources of the East Indies remain in much the same dormant condition in which they have been for two thousand years; but brighter prospects are opening in that great dependency; railways are being constructed, canals formed, river navigation improved, and works of irrigation promoted. One great defect is, however, retained with perverse tenacity. The tenure of land is obstructive alike to the rights of individual ownership, and to its effective cultivation. Without doing the slightest wrong to the holders of any land, its equitable transfer might be sanctioned, and a landed proprietary as influential as in our own country might be established. Protection to life and the rights of property, with every other just adjunct of good government, will inevitably lead to prosperity. Small supplies of cotton, as good as that obtained from New Orleans, are now received from India, and the cotton of this vast dependency is certainly improving; but whilst, from a combination of circumstances and causes, the ryot of India is only paid 12s. per acre for his crop of cotton, and the American cultivator can obtain 12l., the energy and capability of the former cannot be developed. Supposing efforts to be made commensurate with indicated difficulties, all the common cottons, or 75 per cent. of the consumption of Great Britain, might be obtained from India in a couple of years. From Egypt the supply of cotton may increase, but there the withering influence of the despot retards its extended cultivation, though the spirited, energetic, and successful enterprise of Mehemet Ali is an example deserving the imitation of better men. He introduced that agricultural industry into his vice-royalty, and founded a fountain of wealth whence flow millions of annual income to the advantage of Egypt. For all the finer, higher, and better classes of cotton, from New Orleans, Brazil, and Egyptian to the most beautiful Sea Island, Queensland, in Australia, might quickly afford all requisite supplies. That territory alone, besides sustaining the population of Europe, could easily be made to produce all the cotton now consumed in the world; but so sweeping a change and enlarged production need not be deliberated upon, the facts being only referred to as illustrating the powers of that colony. In seeking from the Government the development of the resources of the colonies, the twofold advantage would arise of which that power would financially be greatly benefited, alike at home and in the colonies. Government must set its Colonial house in order. Land grants for beneficial purposes should be free, facilities afforded for emigration, public works promoted, and prosperity will follow in the train. Capitalists, merchants, and manufacturers, whose investments are largely embarked in the cotton trade, have duties devolving upon them. These bodies are known to have large investments in foreign railways, in the cultivation of sugar and other products, and in many dubious securities; but in the cultivation of the staple raw material of their own pursuits they have not ventured to embark. Last year the cotton trade contributed to capital and labour fifty million pounds sterling, and in the last fifty years the aggregate reward has been one thousand millions. Surely from these treasures might be spared some pittance of capital to free the negro, and to insure still greater prosperity to industry. Supposing the Government of our country to be willing to make all the preliminary arrangements which will contribute to the security and profit of capital invested in cotton growing, the clear duty of the class referred to will be to enter upon investments with no niggard hand; and, for their encouragement, it may be mentioned that

very recently an extensive Louisiana cotton-planter has asserted that he could grow cotton at 3d. per lb. which is now worth 9d. per lb. in Liverpool, and of course he has had to buy his labourers, and afterwards to sustain them. The confessed profit is 200 per cent., but, in all sobriety of judgment, cotton growing would afford 100 per cent. of recompense. Here, then, the governing, the capitalist, the mercantile, and the manufacturing classes have duties in common to perform, and from which none of them should withhold their willing help. Upon this subject the warning voice has been long and often heard, and the present embarrassment in cotton supplies has been anticipated. Having, therefore, been forewarned, may this great and world-benefiting industry be fore-armed!

'On the Price of Printing Cloth and Upland Cotton from 1812 to 1860,' by Alderman NEILD.

'On the Altered Condition of the Embroidery Manufacture of Scotland and Ireland since 1857,' by Dr. J. STRANG.

'On the Connexion of Improvements in Cotton Bleaching with Improvements in the Condition of the Factory Population,' by H. ASHWORTH.—Having traced the art of bleaching from its commencement to the present time, and described the present process in an interesting manner, Mr. Ashworth continued to say that, by an art which half a century ago was almost unknown, and by the agency of our coal as fuel, we have succeeded in converting certain products which we dig from under our feet, such as salt, pyrites and lime, into one of the most important branches of manufacturing chemistry. These discoveries in chemistry may appear extraordinary, although they are not more important in the economy of bleaching than are the mechanical arrangements which have superseded the exposure of labourers, in all states of the weather, to the accustomed drudgery of the "crofters" of old. The "crofters," of whom we have spoken, bore the appearance of remarkably strong men; their working dress was of thick white flannel, called "gladding"; the cut of the coat was peculiar, having a loose, open appearance, and a low, flat collar, on which the shirt-collar usually rested. They had their necks uncovered; and, their employment being so much exposed to moisture, they seldom wore stockings. Altogether, they assumed a bearing of unconcern about the state of the weather, and were quite regardless of the splashing of water. Their employment consisted mainly in the handling of wet cloth, and in removing it, either by hand or by wheelbarrows, from one operation to another. Perhaps the most distressing part of their labour was that of carrying upon their shoulders a pile of wet cloth, rising to some height above the head, which they conveyed to some considerable distance in the fields, and spread upon the grass. In the severity of the winter season there would be drippings from the cloth, forming icicles, which would be adhering to the skirts of their clothing. It has been through a succession of mechanical inventions that these laborious operations have been dispensed with, and one after another they have been handed over to the power of the steam-engine. The result has been that the time required for the operation of bleaching is now about as many days as formerly it required weeks to accomplish. Honour to British genius that these advantages have been derived to our country! The general public will, no doubt, feel curious to ascertain whether any, and what proportion of the money saving thus effected has reached the consumer; some other portion of the public will inquire in what extent the advantages thus achieved by science and art have been shared by the operative class employed? It is not expected that much concern will be manifested about the interests of the proprietor, and it is not unreasonable to suppose that a still more minute inquiry will be raised about the "human machine," more especially, whether, during the progress of these advances in manufacturing art, the material, moral, and intellectual condition of the working class has been made to keep pace with all these improved manipulations, which, amidst the struggle of changes, have destroyed the character of many employments, but have greatly increased the whole number of

persons employed? These inquiries it will be our endeavour to satisfy. The advantages shared by the consumer will easily be reckoned. We have before us a printed card, or list of prices for bleaching, issued by a leading firm in the year 1803. At that time the charge for bleaching a well-known description of cloth was 7s. 6d. for a piece of 28 yards, and it is now 6d. The case of the labourers employed in bleaching 60 or 70 years ago was, as before stated, a very harassing one—they suffered severely from exposure to wet and cold, and, as a consequence, from rheumatism and asthma. The earnings of a "crofter" would be from 10s. to 15s. per week. Upon wages so scanty, and with some uncertainty of employment, their mode of living was necessarily inexpensive. Oatmeal was the staple commodity of their food. They used it as porridge; their bread was of oatmeal, either in leavened oat-cakes or baked in the form of a loaf called jannock, which is said to have been introduced by the refugee Flemings; and animal food, with the exception of bacon, was seldom found at the working man's table. Now-a-days, the workmen in bleach-works perform all their work in-doors, and are therefore no longer exposed to the coldness and moisture of the former period. The wages are increased in a proportion which cannot easily be estimated, and their employment is one of great regularity. They have nearly ceased to consume oatmeal; jannock is unheard of; oat-cakes are seldom seen; and their tables are now daily spread with wheaten bread, animal food from the shambles, and all the other articles which usually enter into the consumption of families in the other grades in life. The social condition of the operative bleacher of early times cannot easily be separated from the rest of the working population of that day, neither could they now be described in any other manner than that which would apply to the operatives around them in other pursuits. We may refer to their modes of pleasure-taking as affording in itself a very appreciable indication of the past and present. The amusements which formerly prevailed were rude and boisterous—now they are more refined and intellectual. Bull-baiting, bear-baiting, and cock-fighting were amongst the common amusements of the day, especially at the wakes and fairs. The game of foot-ball was a very favourite one, so much so that the people of one place would make selection of their combatants and have them pitched against those of some other place, and these would contend in very ardent strife for the renown of mastery. Indeed, so very popular was this game that a match at football was upon one day in the year tolerated by the inhabitants in the streets of Bolton. The whole of this is now given up. The game of cricket is becoming a popular one, and others equally harmless in their character are being introduced. Seventy years ago, Sunday schools had made but slight progress. There were but few persons who could read, still fewer who could write; and when any one received a letter, he had to carry it away, perhaps a good many miles, to find a scholar who could read it. At the present time, Sunday schools abound, day schools are numerous, and the affair of carrying away a letter in search of a scholar may now with much complacency be put down as among the reminiscences of seventy years ago.

'Prices in England, 1582-1620, and the effect of the American Discoveries upon them during that Period,' by Prof. ROGERS.

FRIDAY.

Mr. NEWMARCH, the President of this Section, was to-day sufficiently recovered to undertake the duties of his office; and the proceedings, consequently, commenced with the learned gentleman's Address.—He said there was some danger at this time that undue importance should be attached to what had been achieved in physical discovery. Enormous as had been our achievements which had been accomplished in railways,—beholding, as they did, the prominent effects produced by tubular bridges, ocean steamers, telegraphs and by rifled cannon,—there was some danger—and it was not a small one—lest we should attach excessive and undue importance to the obligations which society owed to these achievements, and those discoveries,

great as they were. A glance at the history of the last thirty years would show that there had been in operation economical forces, the effects of which were hardly of less importance. Sound doctrines had been applied to foreign and inland trade, taxation, education, sanitary science, prevention of crime and the poor-laws. Economical science had ceased to be hypothetical, and had become experimental. This, the prominent fact in the history of the last thirty years, was due to the spirit of close scrutiny which had been carried into everything, including history, archaeology, literature and politics. It had been mentioned as a reproach to economical science, that it was not purely a science, but partook largely of the nature of an art. He must confess that this was scarcely a reproach; and the remark arose from a hasty view of the real difference between Science and Art. Science was really a collection of general principles; but all sciences were more or less arts. Astronomy, for example, led to the production of nautical almanacs; and physiology to hospitals, sanitary laws and precautions against fire. Economic science must be essentially an art, inasmuch as its smallest problems involved human interests, affections and passions; and the advances which had been made of late years arose from regarding it both as a science and an art. There was a great want of an accurate and convenient term for social science, which would include morality and religion, education, jurisprudence, municipal law, sanitary science, political economy, the fine arts and the art of government. The Social Science Association had six Sections; namely, jurisprudence and amendment of the law, education, punishment and reformation, public health, social economy, and international laws. It was probable that social science would soon imply, technically, political economy, jurisprudence, sanitary science, education and statistics. He had mentioned statistics, but statistics was not properly a science, like dynamics and chemistry. Statistics had no body of doctrine, or of general laws, of its own. Its generalizations were of the second order. There were five main divisions, namely, vital statistics, criminal statistics, economical statistics, trade statistics, and taxation statistics. In all these, ultimate units were being gradually established. The annual death rate was almost as important as Dalton's law of definite proportions. It had been established that the death rate in a community of human beings inhabiting a country like our own ought not to exceed 17 in 1,000, and taking their stand upon this, they were able to say that where the annual death rate greatly exceeded that figure, there was something wrong. The rate of infant mortality was almost the best test of civilization. From the plan suggested by the Statistical Congress of last year, they should gradually be able to ascertain what was the real condition, and what was the effect of the social relations pervading different parts of the world. The application of the experimental method pursued during the last thirty years had led to a large modification of the early and economic science in reference to free colonization, legal interference with labour, currency prices, the nature and operation of rent, and the effects of a large increase of metallic money. As to legal interference with labour, there was no part of political economy apparently so clear as that which taught that capitalists and labourers should be left to make their own bargain. Prior to Adam Smith and Ricardo, nearly all such interference by law and custom had been mischievous; and, therefore, experience seemed to be on the side of *laissez-faire*, and against guilds, syndics, and government officers. This was true, so long as the labourers were of the adult class, working singly or in small numbers, or in families. But it ceased to be true when manufacturers congregated workpeople in large masses, and largely employed women and children, who were only partially free agents. Capitalists said that the limiting the hours of labour would mischievously and fatally discourage capital; and so it would, in the abstract. But there were these qualifying conditions—that capital, depending for its return upon the order and energy of large masses of persons, must take especial care of the physical

and moral condition of such persons; and that the efficiency of exertion, even with machinery, did not mean unlimited hours of labour, but skilled efforts during the best selected parts of the day. The experiment had fully answered; and the orderly, educated, and contented labourers of Lancashire were security against foreign competition, and a guarantee of peace. Economic science dealt with six principal classes of questions, namely, the nature of wealth, the exchange of commodities, taxation and finance, currency and banks, wages and division of employment, and interference by the State. The last three only were still in dispute. Formerly with regard to these the *laissez-faire* principle seemed to be the general rule; but as society became more complex, it seemed to be clear that the State must in many cases protect individuals. It could not be denied that at present the tendency of civilization was to deal with rights in masses. The conclusion of the whole matter seemed to be, that as the result of the last thirty years, full as that period had been of scientific achievements, they might justly claim for the services rendered by economic science and statistical inquiry a place in the front rank; that they had now arrived at a kind of intermediate point, at which, after long debate, many controversies were finally settled, and from which they might see their way to a higher summit; and that the least doubtful result of their experience had been the discovery that the most solid progress was made by guiding themselves in the main by close observation of facts, and by employing speculative and hypothetical reasoning under the most cautious conditions. But there was a larger moral beyond these results. The last thirty years had been an age of renaissance, because they had found out that human life had higher ends than employment in incessant labour or devotion to excessive gain; that to accomplish these higher ends they must free themselves bodily and wholly of artificial and false supports, and contest with no mimic earnestness for the honour of the first place among modern civilized states. He did not believe in the New Zealander looking upon the ruins of St. Paul's; but rather looked forward to Windsor Castle becoming a West-End mansion, and the villas of the metropolis flourishing on the hills of the White Horse. No community ever decayed in which the poorer classes could earn a reasonable independence.

'On the Progress of Improvements in Manchester and Salford during the last Twenty Years,' by D. CHADWICK.

'On Strikes,' by Dr. J. WATTS.

'On Co-operation and its Tendencies,' by E. POTTER.

'On the Rochdale Co-operative Societies,' by D. STONE.

'Co-operative Stores: their Bearing on Atheism, &c.,' by the Rev. W. R. THORBURN.

'On the Progress of Co-operation at Rochdale,' by the Rev. W. N. MOLESWORTH.

SECTION G.—MECHANICAL SCIENCE.

President—J. F. BATEMAN.

Vice-Presidents—SIR W. G. ARMSTRONG, T. FAIRBAIRN, CAPT. GALTON, THE MAYOR OF MANCHESTER, SIR J. RENNIE, REV. DR. ROBINSON, J. SCOTT RUSSELL, T. WEBSTER, REV. PROF. WALLIS. Secretaries—P. LE NEVE FOSTER, J. ROBINSON, H. WRIGHT. Committee—J. Abernethy, J. G. Appold, T. Aston, C. Atherton, G. Bayley, Admiral Sir E. Belcher, C. F. Beyer, Capt. Blakeley, J. C. Dennis, Capt. Dyer, W. Fairbairn, J. Fenton, Lloyd Foster, T. B. Foster, E. Fothergill, J. Gilbert, A. Henderson, J. Hetherington, J. Hick, J. Hopkinson, W. B. Johnson, A. J. Macarty, sen., J. E. McCulloch, J. K. Napier, J. Oliphant, J. Platt, J. Ramsbottom, E. J. Reed, R. Roberts, N. Scott Russell, C. W. Siemens, J. Smith, W. Smith, Bindon B. Stoney, C. Vignoles, J. Whitworth, Bennett Woodcroft.

THURSDAY.

The PRESIDENT delivered his opening Address. After saying that this Section should especially meet with support in Manchester, he took occasion to point out the many important questions which it might with benefit discuss; naming, amongst other things, gunnery and ship-armour, railway accidents, calling attention to the effects of frost on railway axles, from which so many accidents occurred last winter, as well as to the importance of good signalling, especially referring to the late accidents. He also called attention to the gigantic fires which had lately occurred, and baffled all means for extinguishing them; and he described the means adopted in Manchester,

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viz., the abolition of the old fire-plug and a substitution of firecocks in their place, to which a hose and jets could be attached. He instanced that, at one large fire in Manchester, the fire-engines in connexion with the old plug, which were ineffectual, required 500 men to work them, while on the present system, at a subsequent fire in a warehouse of large size, eleven jets were at work from firecocks in the street within twenty minutes, a small amount of damage was done and a large salvage effected.

Mr. J. OLDHAM read a report 'On the Progress of Steam Navigation at Hull.'

Mr. ATHERTON, Chief Engineer of Woolwich Dockyard, read a very valuable paper, 'On Freight as affected by Difference in the Dynamic Performance of Steamships.'—The object of the paper was to point out a series of deductions from facts which had come under his experience, showing how freight was commercially dependent on the special shape and tonnage of the ship, as well as on the size (an element of the performance) of her engines. He showed the commercial importance to shipowners of these considerations. The ship must be specially fitted in all respects for the special service she is intended for, or she performs at a loss. A ship adapted for one voyage, may fail utterly when placed on a different station, and he was very anxious to call the attention of shipowners to these points.

In the course of the discussion, Mr. J. SCOTT RUSSELL took occasion to state that he fully agreed with the principles laid down by Mr. Atherton, and felt assured that the consideration of them was most important for shipowners to take up. He considered they were much indebted to Mr. Atherton for having brought the subject so clearly before the Section.

Dr. CRACE CALVERT read the next paper, in which he gave the results of investigations into the qualities of some woods suitable for ship-building. He had examined ten different kinds of woods, and the superiority of some of them to English oak could not be too strongly impressed upon the nation. In woods grown in tropical countries the tannin of the English oak is replaced in some instances by resins, and in others by substances similar to caoutchouc. Such was the case with Moulmein teak, Santa Maria and Moira woods, and these woods had therefore great advantage over oak in resisting decay. The facilities for mildewing and decaying were as follows: unseasoned oak, rapid; seasoned oak, rather less; African teak, Honduras mahogany, limited; Moira wood, Santa Maria, and Moulmein teak, none. During his researches he found great difference between oak felled in summer and oak felled in winter; the latter was rich in tannin, the former contained little tannin, but a large quantity of gallic acid. In examining the specimens of wood taken from the well-known gunboats, he found the chemical composition of the wood from the sound boats was identical with that of seasoned oak felled in winter, whilst that from the unsound boats was identical with that of unseasoned oak felled in summer.

FRIDAY.

Mr. J. SCOTT RUSSELL brought before the Section the Report of the Steam Ship Performance Committee; but without reference to the statistical tables which accompanied it, no intelligible abstract can be given of its contents.

Mr. J. HEYWOOD brought before the Section the Report of the Committee on the Patent Laws.—The report pointed out that the revision of the Patent Laws had been one of the objects which had from the foundation of the Association engaged its attention; that since the new Patent Law of 1852 many of the grievances connected with the subject had been remedied, but that still many remained to be removed. These had formed the subject of discussion at the Committees of the Association. At the Liverpool Meeting in 1854 attention was drawn to the fact of 70,000*l.* being annually taken from inventors in the shape of fees. The reports of the Committees at Liverpool, Glasgow, Cheltenham, Leeds, and Aberdeen all concurred in recommending that the surplus then derived from fees, in preference to a reduction in such fees, should be applied at

present to—1st, the erection of suitable offices for the Commissioners of Patents, and a free library of reference and consultation; 2ndly, the erection of a museum for the preservation and exhibition of models of inventions. In the discussion at Aberdeen the inadequacy of the law was strongly insisted on, and the whole subject was recommended to the consideration of the Jurisprudence Section of the Association for the Promotion of Social Science, and the result was the appointment of a joint Committee of the two bodies. This Committee arrived at the following resolutions, and the Report enters fully into the arguments upon which these resolutions are founded:—

"1. That all applications for grants of letters patent should be subjected to a preliminary investigation before a special tribunal. 2. That such tribunal shall have power to decide on the granting of patents, but it shall be open to inventors to renew their applications notwithstanding previous refusal. 3. That the said tribunal should be formed by a permanent and salaried Judge, assisted when necessary by the advice of scientific assessors, and that its sittings should be public. 4. That the same tribunal should have exclusive jurisdiction to try patent causes, subject to a right of appeal. 5. That the jurisdiction of such tribunal should be extended to the trial of all questions of copyright and registration of design. 6. That the scientific assessors for the trial of patent causes should be five in number (to be chosen from a panel of thirty to be nominated by the Commissioners of Patents), for the adjudication of facts, when deemed necessary by the Judge or demanded by either of the parties. 7. That the right of appeal should be to the Court of Exchequer Chamber, with a final appeal to the House of Lords. 8. That for the preliminary examination the assessors (if the Judge requires their assistance) should be two in number, named by the Commissioners of Patents from the existing panel; the decision to rest with the Judge. 9. That the Committee approve of the principle of compelling patentees to grant licences on terms to be fixed by arbitration, or in case the parties shall not agree to such arbitration, then by the proposed tribunal, or by an arbitrator or arbitrators appointed by the said tribunal. 10. That a report be drawn up in conformity with the resolutions passed by this Committee, and that the Council, if such report be approved by them, be requested to allow it to be read at the meeting of the British Association to be held at Manchester this year." The Committee passed a resolution to the effect that the jurisdiction of the proposed tribunal should be extended to the trial of all questions of copyright and registration of design. The Committee conclude their report by stating that they desire in particular to direct attention to the two important points referred to, viz., the preventing the indiscriminate grant of letters patent and the constitution of an efficient tribunal for the trial of patent cases. If these objects can be accomplished, other subordinate matters, and, in comparison, of small importance, will, no doubt, be consistently and satisfactorily arranged.

Mr. HUGHES read the Resolutions passed at a meeting of the Committee of the Manchester Patent Law Reform Association, held on the 30th of August 1861, the Mayor of Manchester in the chair, as follows:—"That in consequence of very peculiar views propounded by certain persons, that inventors have no claim to remuneration for their inventions, however good and useful; that the value of an invention must not be considered in reference to the benefit of the inventor, but its utility to the public; and that the inventive genius of man does not require any stimulus, nor deserve any reward. These novel doctrines, in connexion with the Meeting of the British Association and the Great Exhibition of next year, have caused the Committee of the Manchester Patent Law Reform Association to re-consider the views and resolutions they have so often discussed and adopted at their numerous meetings since 1850. Without intending to justify the present laws in all their details, knowing the many defects which this Committee advocated previous to the alteration in the Patent Laws in 1852, but which, owing to the mischievous

opinions of misdirected parties, were overthrown, and consequently remain to be remedied, they consider it their duty to record a few of the Resolutions extracted from the minutes of their proceedings, which have been discussed and considered in every shape and form, both in Committee and in public meetings assembled frequently in the Town Hall in this city:—1. That it is universally acknowledged that discoveries, inventions and improvements relating to mechanical and chemical science have very greatly conduced to the civilization of mankind, the progress of commerce and the wealth of nations. 2. That the ingenuity of Englishmen especially has effected many valuable inventions and improvements in almost every department of science and manufactures, whereby the commerce, wealth and power of the British dominions have been promoted to an extent unparalleled in the annals of any other nation. 3. That in order to develop to the fullest extent the inventive talents of our countrymen, every encouragement and security should be given to inventors consistent with the public welfare. 4. That the present very heavy expenses, loss of time and other inconveniences, occasioned by the intricate routine or operation of passing through a great number of useless forms to which the inventor is subjected in obtaining letters patent, exhibit a tendency not calculated to encourage, but absolutely to baffle and paralyze the efforts of a class so essential in maintaining the commercial pre-eminence of this kingdom. 5. That for many of the most valuable discoveries and inventions, this country is indebted to the expansive minds of operatives and individuals in humble life, who are prevented from securing to themselves the advantages of their inventions on account of the present expensive process of obtaining protection by royal letters patent. 6. That inventors should not, in obtaining patent right for their inventions, be burthened with any more expenses than such as may be absolutely necessary for the establishment and maintenance of one government office, and for publishing full particulars of all patents granted. 7. That for want of an official record of patents easy of access to the public, many patents are taken out for the same invention, to the serious loss and discouragement of patentees and manufacturers. 8. That the practice of allowing six months to specify the particulars of inventions, for which letters patent have been granted, operates very injuriously, both to patentees and the public, is a source of constant annoyance to persons contemplating patents for inventions, and gives rise to much useless, frivolous and expensive litigation. 9. That the present state of the law involves an expensive, dilatory, inconvenient and uncertain mode of obtaining redress in cases of infringement of patent right; that the Judges of the land have been frequently at variance in their decisions, and that juries are seldom found qualified to understand the matters in dispute. 10. That Commissioners be substituted for the law officers of the Crown, to consist of one person eminently conversant with mechanics, and one conversant with chemistry; the third, in order to form a quorum, to be a barrister, or, if necessary, one of the law officers. 11. That the juries to try patent cases shall be scientific men, conversant with the subject in dispute.—It will be seen from the above extracts that some of the suggestions were embodied in the Patent Law Amendment Act of 1852, as a very great reduction in the cost of obtaining letters patent, a simplification of the process of application, and the publication of all specifications recorded, forming one of the most complete libraries of invention and scientific progress extant; but still this Committee is well aware that further improvements are necessary; and, in considering such further improvements, the interests of the public and the inventor must be taken jointly, and not separately."

Sir W. G. ARMSTRONG then read a paper 'On the Patent Laws,' in which he referred to several instances within his own personal experience of the obstructive operation of the law which enables an individual before he has put his invention into a practicable form, to obtain a monopoly of the idea and then put a stop upon all others who

are directing their attention to the same subject. The obstructive tendency of the Patent Laws is aggravated by the fact, that in addition to the patents which are legally valid, there is an enormous number incapable, if properly opposed, of being enforced at law, but to which people quietly submit in preference to troublesome and expensive litigation. This is a necessary consequence of the patents being indiscriminately granted to all applicants without investigation, and it would be difficult to remedy this evil by any practical preliminary inquiry. The number of patents, valid and invalid, is perfectly frightful, and it is impossible to make out with any certainty what one is at liberty to invent or use.—Sir W. ARMSTRONG pointed out the difference between copyright and patent right, though both ought to protect the product of a man's mind, copyright neither creating impediment nor injustice, while patent right did both. It could not be disputed that the Patent Laws, in restricting the free use of ideas, obstructed invention, if, on the other hand, they encouraged it by holding out rewards, and thus the most that could be said was that they pulled opposite ways, and this could be no warrant to justify arbitrary interference with liberty of action. He considered the reward held out by the Patent Laws much overrated. Although the Patent Laws ought to be discussed solely in reference to public policy, it would be harsh to exclude from consideration the interests of the inventor. If the monopoly were withheld, the inventor got the start of all others, and the presumption was that understanding his subject better than others he would keep the lead. The public have great faith in a name, and a reputation duly earned is not easily lost. Under any state of the law hardships of inadequate reward must occur, and these cases he considered should be met by grants from the State. He instanced the inventor of the screw-propeller, who was unable to obtain any advantage from the law, whilst another person who conceived the simple idea of enabling postage-stamps to be easily separated by punching a series of small holes between them, was placed in a position to obtain an exorbitant recompense from the Government. Sir W. ARMSTRONG, whilst he admitted that the law was capable of amelioration by having special tribunals for the grant and trial of patent rights, compulsory licences and the abolition of the right to patent foreign inventions; yet he regarded the whole system as unnecessary and impolitic, and could see no other complete remedy for its evils than its entire abolition.

Mr. T. WEBSTER followed, with a paper 'On Property in Invention and its Effects on the Arts and Manufactures.'—He pointed out that considerations of public policy had led to certain rules or laws respecting the use and enjoyment of all property, and that the same principles to which the origin of all property is to be referred, had peculiar claims to recognition with regard to the inventor. To say that an inventor may retain command over his invention by secrecy is to propose an impossibility in a majority of cases, and in the few cases in which it might be done the effect would be to convert his art into a mystery and restrictive practices long since condemned. The author pointed out the fallacy of stigmatizing patents as contrary to the principle of free trade, as was commonly done. He admitted the injury done by the indiscriminate grant of patents; and this, which might be remedied, ought not to be used as an argument against the system. He pointed out that although for small inventions and such as could be quickly introduced a patent might not be needed, yet that where time and capital were required to introduce the inventions into use such inventions would not be made and perfected unless the inventors were protected from piracy by letters patent. He thought the cases of obstruction, in practice, were more imaginary than real. The law admitted of successive patents for improvements, and practically it was rare that a prior inventor would not come to reasonable terms with a subsequent one. At all events, the case might be met by applying to this species of property that which the legislature had already applied to other kinds of property, viz., the powers of the "Lands Clauses

Consolidation Act," where lands were taken compulsorily.

Mr. WEBSTER then read a paper contributed by R. A. MACFIE, 'On Patents considered Internationally.'

Mr. W. SPENCE read a paper 'On Patent Tribunals,' in which he argued against the practicability of any plan of preliminary investigation of the merits of inventions before granting patents in any form that had been suggested. He, however, thought that the difficulties in the way of preliminary investigation did not apply to the trial of cases after a patent had been granted, and he fully concurred in the necessity of a special tribunal for such purpose.

At the end of the reading of the foregoing papers a lengthened discussion took place.—Lord WROTESLEY pointed out the importance of the speakers distinguishing carefully between the evils which could be cured by legislation, and those which could not.—Mr. W. FAIRBAIRN (the President of the Association) said the object of the Patent Law Reform Association was to lessen the cost of patents, and improve the administration of the law, not to do away with it.—Mr. R. GROVE said the question of patents or no patents was one which was fairly arguable, and personal convenience or inconvenience had much to do with the part which individuals might take. The number of patents granted for frivolous inventions was an evil, no doubt; but the objection on this score applied rather to the mode of granting than to the principle of patents generally. If any restraint were put on the indiscriminate grant of patents, it was possible, that in stopping a number of frivolous patents, a valuable invention, which might in the first instance appear frivolous, would be denied the privilege. This, however, was a risk that all things were liable to. He would not discuss the question of natural rights. Was it an encouragement to the inventor, and did you by locking up the invention injure the public? That was the point of view in which he thought it should be looked at. Assuming Sir William ARMSTRONG to be right in desiring to abolish patents altogether, he thought it impossible to do so at the present time, as the public, at all events, were not yet prepared for it; and while that was so, the result must be injurious, as no law could be abolished or altered with a satisfactory result unless the public as a body were prepared to receive it. He thought the notion of any inventor on mere application having a right to a patent absurd, and contrary to the true intent and meaning of the Act of James, though he admitted in practice the question was not so treated now. He thought that before the patent was granted, the inventor should make out a *prima facie* case for the grant, and that a proper tribunal for conducting a preliminary examination should and could satisfactorily be established. Such tribunal should conduct its proceedings openly. Opposition should be advertised for. This would operate at once in numerous instances as a check on applications. As to rewards by the State, as advocated by Sir W. ARMSTRONG, he thought such a system was impossible. Who were to be the judges? Was it Government or Parliament? In any case the jobbing injustice to which such a system must give rise would be frightful. He also thought that the trial of patent cases should be conducted before a special tribunal. Such a tribunal he considered should be presided over by a legal mind assisted by scientific assessors. Juries were not desirable; experience had shown him that the jury system in patent cases constantly failed to give satisfaction. He also thought that the preliminary tribunal might decide on the term to be granted according to the case made. In all cases there must be some imperfection—the best system could only be an approximation. Doubtless there were some inventions that would come, patent or no patent, but there were many that would not come without a patent. For his own part, looking at the whole question carefully, and balancing the evil with the good, he could see no other remedy for the case than the grant of a patent.—The MAYOR of MANCHESTER said he was connected with a large manufacturing firm, and had some experience of the way in which the Patent Laws acted as a stimulus to invention,

and he pointed out the difficulties which existed in introducing a new invention unless protected by patent. He, however, did not think that any Court for preliminary examination was practicable. No such Court could ever get through the work; the utility of the invention ought not to be entered upon, as it could not fairly be judged beforehand, and novelty could not be tried, as nobody would take the trouble to make the necessary search for the purpose. He, however, thought that there should be a special Court to try patent cases.—Capt. BLAKELEY thought that patents were neither useful to the public nor inventors.—The Right Hon. J. NAPIER thought that on the grounds of justice and policy patents should be granted, but he condemned the present system on which patents were granted indiscriminately. The law officers of the Crown, of which he had been one, were heavily taxed with their professional and official duties, and could not give that attention to the granting of patents which was in his opinion essential. He considered that an inventor should make out a *prima facie* case before the patents should be granted to him. He also advocated a special tribunal.—The Right Hon. LORD STANLEY thought that State rewards for inventors were out of the question. Parliament was most unfit for determining such questions, and he did not see how any satisfactory tribunal could be established for the purpose. How, then, are inventors to be rewarded, unless by grant of a patent? If you have no patent, then you are driven to the system of secrecy; and that is fatal. He approved of the system of compulsory licences, though there may be difficulties. He also advocated the necessity of some sifting process previous to the grant.—Mr. T. ASTON advocated the necessity for patents. Unless there were patents the inventor had nothing to exchange against capital. With regard to licences by previous patentees he thought that in a large majority of the cases no difficulty whatever existed; it was the interest of the previous patentee to come to an arrangement with the subsequent one. He had never heard of any practical difficulty in obtaining a licence.—Mr. A. SMITH thought the question must be tried on the view of whether the patent was a benefit to the inventor and the public, or to either of them. If for the benefit of both the public and the inventor, there was an end of the question. He, however, did not admit that, nor did he consider that either was benefited.—Mr. NORMAN said they must not forget that in America the preliminary examination was in use.—Mr. R. ROBERTS said, that his experience had shown him that without the protection of a patent no inventions requiring time, skill and capital to perfect would ever be made, and he instanced the case of his own invention of the self-acting mule, which had taken some years to perfect and a large outlay of capital.—Mr. WINKWORTH spoke in favour of the abolition of all patent rights.—Mr. J. SCOTT RUSSELL said, that he advocated the views of Sir William ARMSTRONG as regarded the abolition of patents, but as to the establishment of any tribunal for rewarding inventors he considered that as only suited for Utopia.

MUSIC AND THE DRAMA

ALFRED MELLON'S PROMENADE CONCERTS, THEATRE ROYAL, COVENT GARDEN. Grand orchestra of nearly 100 performers.—During the week the following Vocalists will appear.—Mlle. Parepa, Mlle. Florence Landi, Madame Laura Baxter, Mr. G. Perren, and Mr. Weiss.—On Monday, at Eight precisely, a Symphony, by Haydn; Tuesday, a Symphony, by Mozart; Wednesday, a Symphony, by Beethoven; Thursday, a Symphony, by Spohr; Friday, a Symphony, by Mendelssohn; Saturday, a Volunteer Night, when Beethoven's Battle Symphony will be given. Commence at Eight. Promenade, One Shilling.—Conductor, Mr. Alfred Mellon.

MDLLE. WHITTY will appear at the THEATRE ROYAL, DUBLIN, on September 17th, in 'PRITANI'; on the 18th, in 'NORMA'; and on the 19th, in 'IL BARBIERE,' with Titicas, Gugliini, Swift, Lemaire, Della Sedie and Ciampi.

SADLER'S WELLS.—On Saturday, Mr. Phelps recommenced his management of this theatre for the legitimate dramatic season, with the play of 'The Hunchback.' The heroine was performed by Mrs. D. P. Bowers, from the United States, who, with others, has sought a temporary refuge from civil war on the English stage. We are told that the lady has made a decided impression in America. We doubt, however, whether she will ensure an

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equal reputation in this country. The audience gave her a hearty reception; but it was evident that, in the course of the performance, they were rather puzzled than pleased, and startled rather than struck. Her voice and elocution were good; but her taste was often capricious. It is almost as difficult to meet with good taste as great genius. With regard to our American actress, she is happily now placed in a school where the audience will soon correct her errors, and teach her reverence for the great poets whom she will have to interpret. She has many qualifications, though small of figure and deficient in physical force for the performance of tasks in which elocutionary vehemence is required. But she has, owing to material weakness, frequently to substitute declamatory artifice for real passion; and sometimes, instead of the natural gesture or movement, substitutes a stage attitude or a theatrical action. She is evidently a well-practised actress, and many of these exaggerations are doubtless the result of mis-education. Miss Murray performed *Helen*, and delighted the audience with her vivacity; and Mr. Edmund Phelps, as *Sir Thomas Clifford*, acted with laudable care. The house was exceedingly full, and the applause abundant.

SURREY.—The management have made a great effort to give *éclat* to their season which opened on Saturday, with a version of *Le Crétin de la Montagne*, by MM. E. Grangé and L. Thiboust, under the title of 'The Idiot of the Mountain.' The drama has been reduced to three acts from five, and is crowded with characters, situations, and scenic effects. The character of the idiot is most elaborately supported by Mr. Creswick, who strives not unsuccessfully to show the gradual growth of intellectual illumination in a rude mind under the influence of beauty, and produces often a very picturesque effect by the attitudes and gestures which are its exponents. The heroine, *Jeanne Purcell*, is very pleasantly represented by an American actress, Miss Georgiana Pouncefort, who seems by her kindness and grace to justify the number of admirers by whom her hand is solicited. Mr. Fernandez, as her accepted lover, played with a true soldierly dash and vivacity that carried the audience with him. Mr. Vincent, as his villainous father, who is guilty of more than one murder, and is the evil genius by whom the calamities are produced that form the action of the piece, was stern and gloomy enough. He is new to London, and is likely to acquire celebrity in this class of characters. Mr. Shepherd was evidently pleased with his part of *Ravel*, the smuggler, and made love and sought revenge with equal ardour and intensity. The scenery of the new drama, painted by Messrs. Brew and Johnson, is in all points excellent; the set scenes are also as ingenious as they are beautiful. The drama was followed by a new operatic interlude, on an old subject, called 'Shakespeare's Dream; or, Shakespeare's Early Days.' The young Bard, personated by Miss Edwards, strays into the fairies' haunt in a wood, and sleeps. Titania and her train discover the intruder, and would at first punish his presumption; but give way to more generous thoughts, and invest him with fairy gifts instead. The performers were scarcely equal to the delivery of the blank verse, but some airs and duets were pleasantly sung. Miss Camilla Chipp, as *Titania*, and Mr. Maurice De Solla, as *Puck*, won plaudits from the audience and were frequently *encored*. It is unnecessary to add, that both pieces were successful.

MUSICAL AND DRAMATIC GOSSIP.—Report speaks favourably of the Hereford musical meeting. The safe old works were given, and with sufficient force to attract a good local audience; but as musical novelty was entirely wanting to the performance, our duty to it is done when we record the apparent commercial success of the festival.

Miss Cushman has returned from what is understood to be her farewell tour in America.

'Alceste,' we hear from Paris, is to be kept back till 'the season' is nearer at hand. Meanwhile, Madame Viardot has been singing in 'Le Trouvère,' with great success, and will appear in other parts of the *mezzo-soprano* repertory.

A friend in Leipzig sends us a summary of what is doing, musically, in that city:—"During the summer but little has occurred in the immediate neighbourhood of Leipzig, that would be of interest to your musical readers. The 'Riedel Society' has been continuing its admirable performances, perpetuating the knowledge of what is old and good, and enabling the public to judge of new works by Robert Franz, Volkmann, Papperitz, Fink, Listz, and others.—The 'Sing-Academie' gave a performance of Handel's 'Messiah.' The singers and members of the orchestra were all amateurs, and therefore we ought not to be too severe in judging their performances; but I could not help feeling again, if this be the style in which Handel's music is rendered, it is no wonder that he is comparatively so little appreciated on the Continent. Some of the readings were totally different from any I have heard in England, nor could I think them improvements. One which struck me as particularly objectionable was the way in which the glorious 'For unto us a Child is born' was given. It was commenced as a quartet, the chorus only coming in at the 'Wonderful!' &c.; and not until the last repetition did the chorus take up the whole theme. 'His yoke is easy' was also sung in the same way. The 'Tonkünstler Verein' has had its assembly at Weimar. This society is especially occupied in making propaganda for the 'Zukunft' music, and this year its speakers came forward with that pugnacious intolerance which one so often finds among those who claim the right of being freed from the restraints which the experience of the past has consolidated into the leading rules which must govern the arts and sciences. Some extracts from an opera by Cornelius were generally liked; but the majority of the other works—almost all of the 'Zukunft' school—although much applauded by the disciples of that school, were by no means calculated to win the unprejudiced to the new views. The finest performance was Beethoven's 'Missa Solennis,' sung by the members of the Leipzig 'Riedel Verein'; the same society also sang, at short notice, and without rehearsal, one of Bach's Motets with admirable precision. Gounod's 'Faust' seems making the round of the German theatres. Last week it was produced at Dresden; this week here; and it is also in preparation at Stuttgart, where it is to be performed among the other festivities in honour of the King of Württemberg's birthday. The great beauties of this opera have already been mentioned in your columns, so that I need only add that it promises to become very popular, although by many the treatment to which Goethe's text has been subjected is regarded as little short of sacrilege. In one of the last soirées of the Conservatorium a new Concerto (in F sharp minor), by Ferdinand Hiller, was very finely played by Mr. Franklin Taylor, of Birmingham. This Concerto is a work of such excellence that it is well worth the study of all who can surmount its difficulties; and it has the additional great merit of not being too long. In the dearth of new works for the piano, which can bear being placed by the side of the classical Concertos, this composition is really a treasure. The first volume of Mendelssohn's Letters has appeared. The more one sees of the man, the more truly great and loveable does he appear."

MISCELLANEA

Jahn Monument.—At the general German Turner Festival, at Berlin, some Italian "Turnvereine" were expected. They were prevented from appearing, but have resolved to contribute for the monument to the memory of Jahn. The Turnvereine, of Turin, which counts among its members the two sons of Victor Emmanuel, has already sent for that purpose a fine slab of white marble from the Apennines. The stone bears the inscription, "Società equestre ginnastica di Torino," and on the back the name of the place whence it had been procured—"Apennini." The Scandinavian "Turners" have also announced to the Berlin Turnrath that they have hewn six granite boulders from the Scandinavian Highlands for the Jahn monument.

TO CORRESPONDENTS.—J. A. C.—P. W.—S. F. C.—C. R.—G. G.—A. Constant Reader—G. S.—J. O. R.—E. S.—received.

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	£. s. d.	£. s. d.	Yrs	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	
30			30						
40	1 1 0	2 18 4	40	3 2 7	1 4 3	0 12 3			
50	2 3 4	4 5 0	50	3 7 6	1 4 4	0 12 4			
60	3 6 8	6 13 4	60	5 3 2	1 4 6	0 12 5			
			60	9 3 2	1 4 8	0 12 6			

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30	1 1 3	1 3 7	3 5 5	3 0 7
40	1 5 0	1 6 9	3 0 7	2 14 0
50	1 14 1	1 19 10	4 4 0	4 0 11
60	3 17 0	4 13 9	6 10 0	6 10 0

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